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# **Sediment-Water Fluxes and Sediment Analyses in Chesapeake Bay: Tidal Fresh Potomac River and Maryland Main Stem**

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**WQRP**

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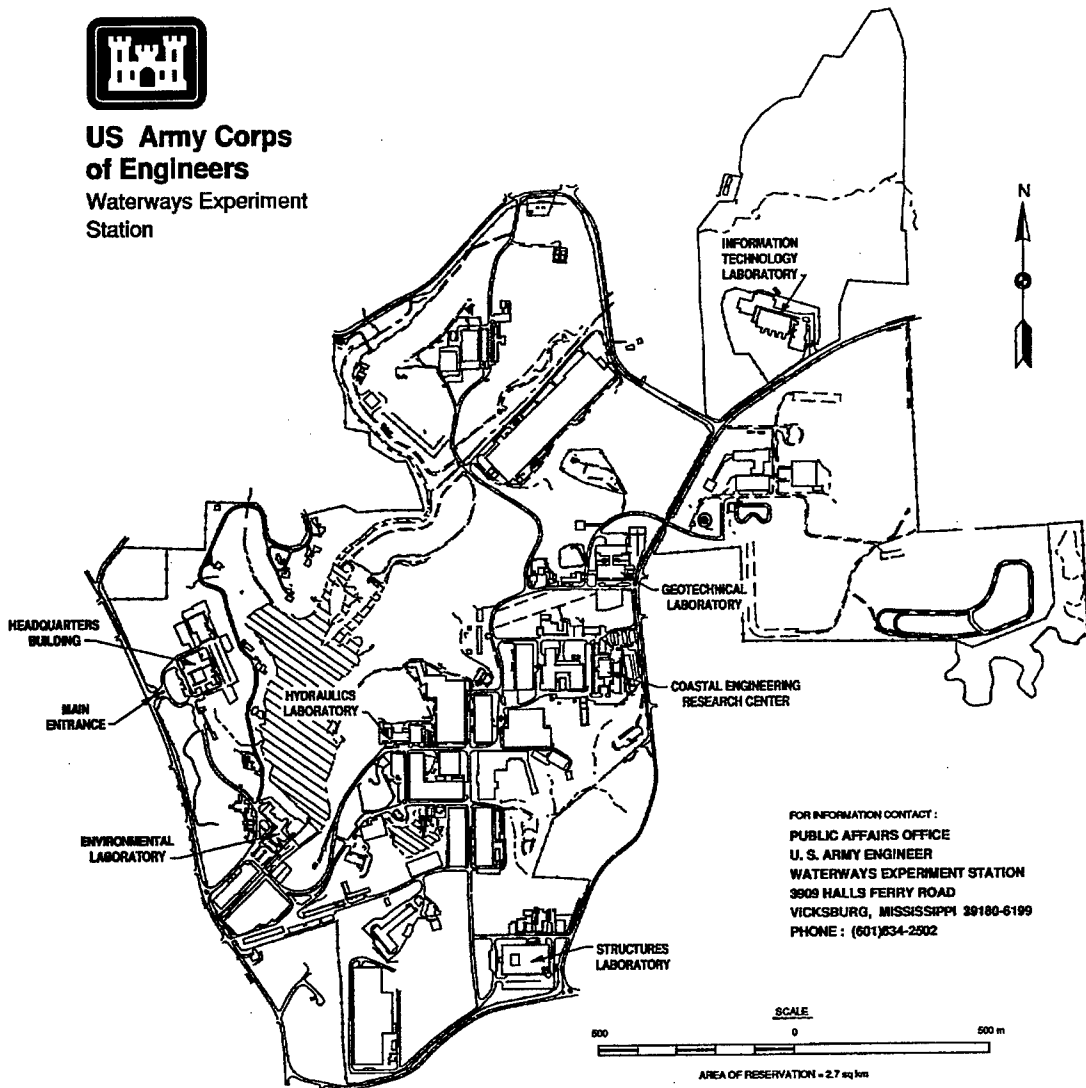
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# Contents

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|   |    |
|---|----|
| Preface .....   | v  |
| 1—Introduction .....  | 1  |
| Background Information .....  | 1  |
| Conceptual Model of Estuarine Metabolic Processes<br>in Chesapeake Bay .....                | 1  |
| Objectives .....  | 2  |
| 2—Project Description .....   | 3  |
| Station Locations .....   | 3  |
| Sampling Frequency .....  | 3  |
| 3—Field Methods .....   | 6  |
| Water Column Profiles .....   | 6  |
| Bottom Water Analyses .....   | 6  |
| Sediment Profiles—Solid Phase and Pore Water Analyses .....                                 | 6  |
| Sediment-Water Fluxes .....   | 7  |
| 4—Chemical Analyses .....   | 11 |
| 5—Summary of Major Sediment-Water Fluxes .....  | 14 |
| Sediment Oxygen Consumption .....   | 14 |
| Ammonium and Phosphate .....  | 14 |
| Total Carbon Dioxide .....  | 18 |
| References .....  | 20 |
| Appendix A: Water Column Profile Data Tables .....  | A1 |
| Appendix B: Bottom Water Dissolved Nutrient Data Tables .....                               | B1 |
| Appendix C: Sediment Samples: Solid Phase Data Tables; Dissolved<br>Phase Data Tables ..... | C1 |
| Appendix D: Incubation Core Nutrient Concentration Data Tables .....                        | D1 |
| Appendix E: Sediment-Water Oxygen and Nutrient Flux Data Tables ...                         | E1 |
| SF 298  |    |

## List of Figures

---

|           |  |    |
|-----------|--|----|
| Figure 1. | Map of Potomac River and Maryland main stem:<br>station locations occupied during 1994 . . . . . | 4  |
| Figure 2. | Schematic diagram of incubation chamber . . . . .  | 8  |
| Figure 3. | Potomac River and Maryland main stem sediment<br>oxygen consumption rates for 1994 . . . . .     | 15 |
| Figure 4. | Potomac River and Maryland main stem ammonium<br>flux rates for 1994 . . . . .                   | 16 |
| Figure 5. | Potomac River and Maryland main stem phosphate<br>flux rates for 1994 . . . . .                  | 17 |
| Figure 6. | Potomac River and Maryland main stem total carbon<br>dioxide flux rates for 1994 . . . . .       | 19 |

# Preface

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The work reported herein was conducted as part of the Water Quality Research Program (WQRP), Work Unit 32694. The WQRP is sponsored by Headquarters, U.S. Army Corps of Engineers (HQUSACE), and is assigned to the U.S. Army Engineer Waterways Experiment Station (WES) under the purview of the Environmental Laboratory (EL). Funding was provided under Department of the Army Appropriation No. 96X3121, General Investigation. The WQRP is managed under the Environmental Resources Research and Assistance Programs (ERRAP), Mr. J. L. Decell, Manager. Mr. Robert Gunkel, Jr., was Assistant Manager, ERRAP, for the WQRP. Program Monitors during this study were Messrs. Frederick B. Juhle and Rixie Hardy and Dr. John Bushman, HQUSACE.

Principal Investigator of the Work Unit was Dr. Carl F. Cerco, Water Quality and Contaminant Modeling Branch (WQCMB), Environmental Processes and Effects Division (EPED), EL. The study was conducted under the supervision of Dr. Mark S. Dortch, Chief, WQCMB, and Mr. Donald L. Robey, Chief, EPED. Report review was provided by Dr. Barry Bunch, WQCMB, and Mr. Ross Hall, WQCMB. Dr. John W. Keeley was Director of EL.

This report was prepared by Dr. Walter Boynton, Chesapeake Biological Laboratory (CBL), Solomons, MD, Dr. Pete Sampou, Horn Point Environmental Laboratory, Cambridge, MD, Ms. Janet Barnes, CBL, Ms. Barbara Weaver, CBL, and Mr. L. Magdeburger, CBL. The report describes field studies to provide data for development and calibration of a freshwater sediment diagenesis model.

At time of publication of this report, Dr. Robert W. Whalin was Director of WES, and COL Bruce K. Howard, EN, was WES Commander.

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# 1 Introduction

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## Background Information

Recent water quality models and nutrient mass balance budgets indicate that sediment-water exchanges of oxygen and nutrients across the sediment-water interface are a major feature of estuarine nutrient cycles. These cycles play an important role in determining estuarine water quality and habitat conditions. For example, during summer periods when water quality conditions are typically poorest (i.e., anoxic conditions in deep water and algal blooms), sediment releases of nutrients (e.g., nitrogen and phosphorus) and consumption of oxygen are often highest.

These models also indicate that the total metabolic processes within estuarine sediments and the resulting fluxes into and out of these sediments are very dynamic. Past studies by the Ecosystem Processes Component of the Maryland Chesapeake Bay Water Quality Monitoring Program have concentrated mainly on the processes of aerobic metabolism and the input of organic matter and nutrients from both natural and anthropogenic sources driving these processes. However, other studies (Jorgensen 1977; Howes, Dacey, and King 1984; Howes, Dacey, and Teal 1985) indicate that in some cases over 50 percent of the sediment metabolic processes can be attributed to anaerobic metabolism. Anaerobic and aerobic metabolism are tightly coupled not only with each other, but also with the standing stocks of many compounds in the top few centimeters of sediment, including particulate and dissolved organic matter and various other reduced compounds.

## Conceptual Model of Estuarine Metabolic Processes in Chesapeake Bay

Metabolic processes associated with estuarine sediments have a considerable influence on water quality and habitat conditions in the Bay and its tributaries. Nutrients and organic matter enter the Bay from a variety of sources, including sewage treatment plant effluents, fluvial inputs, nonpoint drainage, and direct rainfall on Bay waters. These dissolved nutrients are rapidly incorporated into particulate matter via biological, chemical, and physical

mechanisms. Much of this particulate material then sinks to the bottom and is potentially available for remineralization. Essential nutrients released during the decomposition of organic matter may then be utilized by algal communities. A portion of this newly produced organic matter sinks to the bottom, contributing to the development of anoxic conditions and loss of habitat for important infaunal, shellfish, and demersal fish communities. The regenerative capacities and the potentially large nutrient storages within bottom sediments ensure the ample return flux of nutrients from sediments to the water column, which sustains continued phytoplankton growth. This growth in turn supports deposition of organics to deep waters, creating anoxic conditions typically associated with the eutrophication of estuarine systems.

Once these anoxic conditions develop, anaerobic metabolism begins to dominate the system. The oxidation of available organic matter under anoxic conditions occurs via the reduction of compounds other than oxygen: sulfate reduction dominates in regions of the Chesapeake Bay where sulfate is readily available while methanogenesis dominates in the freshwater regions.

## Objectives

The objectives of this U.S. Army Engineer Waterways Experiment Station (WES) project included collecting data to aid in the ongoing characterization of the present state of the Chesapeake Bay and its tributaries (including spatial and seasonal variation). The variables measured include measurements of the stocks of several organic compounds associated with the top 10 cm of sediment, measurements of the stocks of the compounds involved in the metabolic processes in the sediments, and measurements of the resulting fluxes into and out of the sediments. These data are available to further calibrate the coupled hydrodynamic/water quality/sediment flux model of Chesapeake Bay, especially for applications to low salinity regions. The information collected in this program can be compared with data from other elements of the Chesapeake Bay Monitoring Program to gain a better understanding of the processes affecting Chesapeake Bay water quality, especially in low salinity regions.

## 2 Project Description

---

### Station Locations

The four WES station locations for the sediment-water fluxes and the sediment analyses are identified in Figure 1 and Table 1. There are three stations located in the tidal fresh Potomac River and one station in the Chesapeake Bay Maryland main stem. These stations were visited four times from May - October 1994 (Table 2).

### Sampling Frequency

The station sampling frequency is based on the seasonal patterns of sediment water exchanges observed in previous studies conducted in the Chesapeake Bay region (Kemp and Boynton 1980; Kemp and Boynton 1981; Boynton et al. 1982; Boynton and Kemp 1985) as well as previous sediment-oxygen and nutrient exchange (SONE), mini-SONE, and benthic exchange and sediment transformation (BEST) data. These studies indicted several distinct periods over an annual cycle including the following:

- a. April and May, when the spring phytoplankton bloom occurs and water column nutrient concentrations are high (particularly nitrate).
- b. June, influenced by the presence of a large macrofaunal community.
- c. July, August, and September, when macrofaunal biomass is low, but water temperature and water column metabolic activity is high and anoxia prevalent in deeper waters.
- d. October and November, when anoxia is not present and the macrofaunal community abundance low but re-establishing.

Previous studies also indicate that short-term temporal (day-week) variation in these exchanges is small; however, considerable differences in the magnitude and characteristics of fluxes appear among distinctively different estuarine zones (i.e., tidal fresh versus mesohaline regions). Since benthic fluxes are small when water temperatures fall below 12 to 15 °C, monitoring during

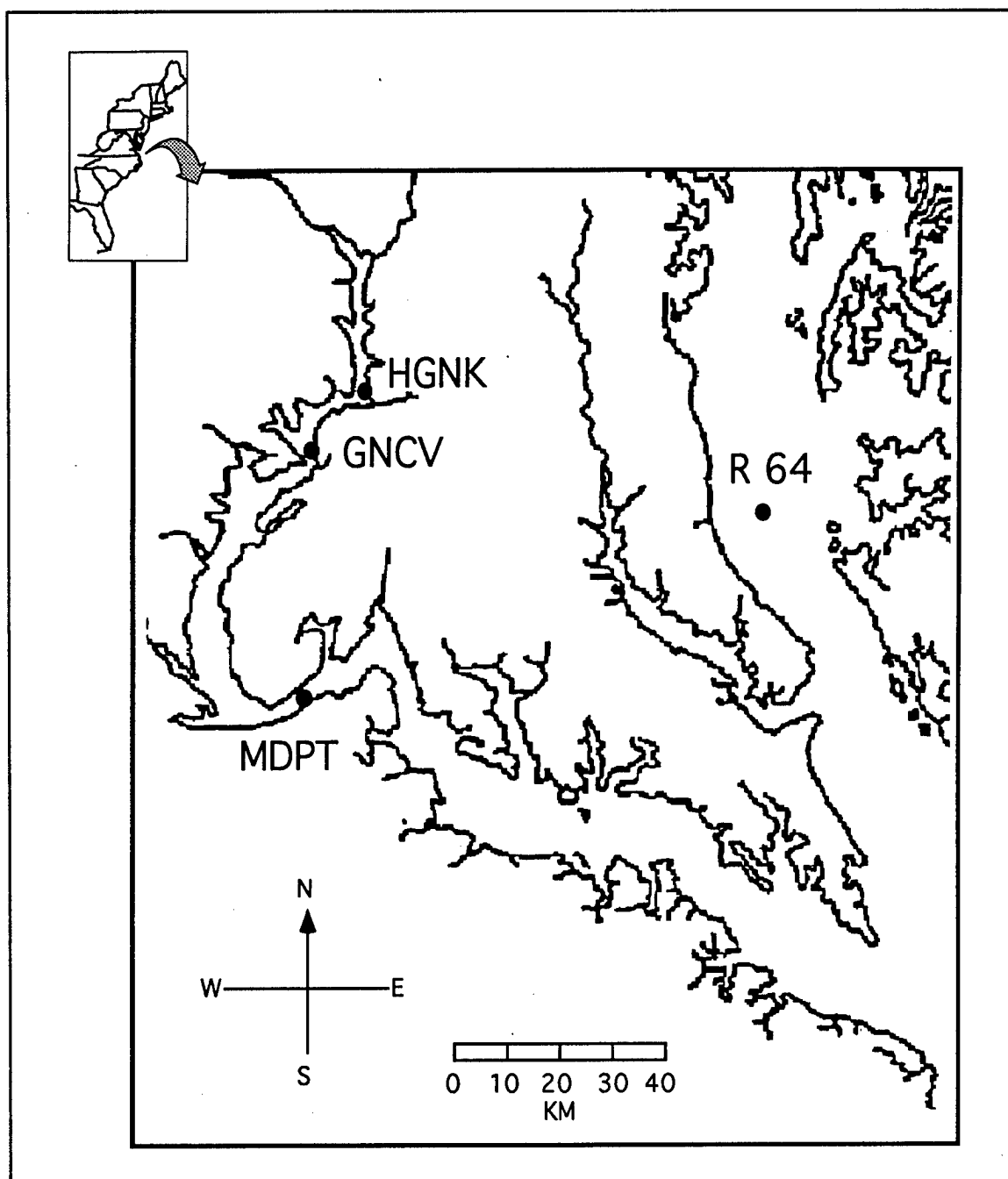


Figure 1. Map of Potomac River and Maryland main stem: station locations occupied during 1994

winter and early spring does not yield as much useful information as when large fluxes are observed from May through October. For example, during this warmer time, N and P fluxes exceed total annual loading from other sources by as much as a factor of 4.

**Table 1**  
**Numerical Water Quality and Contaminant Modeling (EL-22) Tidal**  
**Fresh Potomac River and Maryland Main Stem Stations: Station**  
**Name, Code, and Location**

| Station        | Code | Location   |            |
|----------------|------|------------|------------|
|                |      | Latitude   | Longitude  |
| Hedge Neck     | HGNK | 38' 44.17" | 77' 02.03" |
| Gunston Cove   | GNCV | 38' 39.33" | 77' 07.45" |
| Maryland Point | MDPT | 38' 21.18" | 77' 11.34" |
| Main Stem      | R 64 | 38' 33.59" | 76' 25.63" |

**Table 2**  
**Sampling Frequency: Stations and Sampling Dates**

| Station | May | July | August | October |
|---------|-----|------|--------|---------|
| HGNK    | 19  | 12   | 9      | 13      |
| GNCV    | 19  | 12   | 9      | 13      |
| MDPT    | 20  | 13   | 10     | 14      |
| R 64    | 21  | 14   | 11     | 17      |

## 3 Field Methods

---

### Water Column Profiles

At each of the four WES stations, vertical water column profiles of temperature, conductivity, salinity, and dissolved oxygen were measured at 2-m intervals (0.5- or 1-m intervals at shallow stations) from the surface to the bottom. A submersible pump and a Hydrolab S-II Data Sonde CTD were used to obtain the readings. Water column turbidity was measured using a Secchi disc. (See Appendix A.)

### Bottom Water Analyses

Near-bottom (approximately 1 m) water samples were collected using a high volume submersible pump system. Samples were immediately processed and frozen for later analysis of the following compounds: ammonium ( $\text{NH}_4^+$ ), nitrite plus nitrate ( $\text{NO}_2^- + \text{NO}_3^-$ ), dissolved inorganic phosphorous ( $\text{PO}_4^{3-}$ ), siliceous acid  $\text{Si}(\text{OH})_4$ , dissolved organic nitrogen (DON), dissolved organic phosphorus (DOP), dissolved organic carbon (DOC), total carbon dioxide ( $\text{TCO}_2$ ), total iron (Fe), total manganese (Mn), and sulfate ( $\text{SO}_4^{2-}$ ) concentrations. The bottom water pH was also measured. (See Appendix B.)

### Sediment Profiles—Solid Phase and Pore Water Analyses

Zero to ten-centimeter sediment composites were subcored from the 6-in. cores and prepared for solid and pore water analyses. (See Appendix C.) For the solid phase analyses, 50-ml centrifuge tubes (each one containing a 1-in. in diameter 0- to 10-cm subcore) were frozen and returned to either Nutrient Analytical Services Laboratory (NASL) at the Chesapeake Biological Laboratory (CBL) or to Dr. Peter Sampou at the Horn Point Environmental Laboratory (HPEL). Solid phase analyses were conducted by NASL and included particulate carbon (PC), particulate nitrogen (PN), particulate phosphorus (PP), and total and active chlorophyll-*a* concentrations. Solid phase

compounds analyzed by Dr. Sampou at HPEL included biogenic silica (BiSi), acid volatile sulfur (AVS), chromate reducible sulfur (CRS), iron (Fe), calcium carbonate ( $\text{CaCO}_3$ ) phosphorus (using both the Aspila and Ruttenberg extractions), and manganese ( $\text{Mn}^{+2}$ ).

To prepare the composites for pore water analyses for NASL, 50-ml centrifuge tubes containing the 0- to 10-cm composites were centrifuged at 4,000 rpm for 10 min; pore water was then filtered and frozen. NASL analyzed pore waters for  $\text{NH}_4^+$ ,  $\text{NO}_2^- + \text{NO}_3^-$ ,  $\text{PO}_4^{3-}$ ,  $\text{Si(OH)}_4$ , alkalinity (Alk), DOC, DON, and DOP.

Dr. Sampou's centrifuge tubes containing sediments for pore water analyses were held in ice, but not frozen. These were later analyzed for chloride ( $\text{Cl}^-$ ),  $\text{SO}_4^{2-}$ , calcium ( $\text{Ca}^{+2}$ ), manganese ( $\text{Mn}^{+2}$ ), Fe, and  $\text{TCO}_2$ .

Pore water pH was measure directly in the centrifuge pore water using a Hanna Piccolo Plus ATC Temperature pH meter.

To prepare pore water  $\text{H}_2\text{S}$  samples for analyses by Dr. Douglas Capone's laboratory at CBL, a 2-cm slice of a large box core was packed into a centrifuge tube, spun for 10 min at 4,000 rpm, then filtered into a preweighed scintillation vial containing 0.5 ml of zinc acetate. Five depths were analyzed: 0 to 2, 2 to 4, 4 to 6, 6 to 8, and 8 to 10 cm. The large core was divided into two halves, side A and side B. Two replicates were taken at each depth, one sample from side A and one from side B. After sampling in the field, the samples were kept on ice.

To prepare pore water methane and porosity samples for analyses in Dr. Capone's laboratory, two 3-ml syringes (with cut off ends) of sediment were extracted at each 2-cm interval to a depth of 10 cm. Again the large box core was divided into two halves, side A and B, and one sample taken from each side at each depth. Each syringe of sediment was injected into a glass serum vial. The vial was sealed using a rubber serum cap and a crimp top, then frozen.

## Sediment-Water Fluxes

Three intact sediment cores were obtained at each WES station using a modified Bouma box corer. These sediment cores, each contained in a 15- by 30-cm Plexiglas microcosm (Figure 2), constitute the basic system where changes in oxygen, nutrient, and other compound concentrations are determined. A decrease in these overlying water concentrations implies uptake (either biologically or chemically) of the compounds by the sediments. Conversely, an increase in concentration implies release by the sediments. (See Appendixes D and E.) An overview of the measurement techniques follows.

After deployment and retrieval of the box corer, the Plexiglas microcosm containing the sediment core is visually inspected for disturbances such as

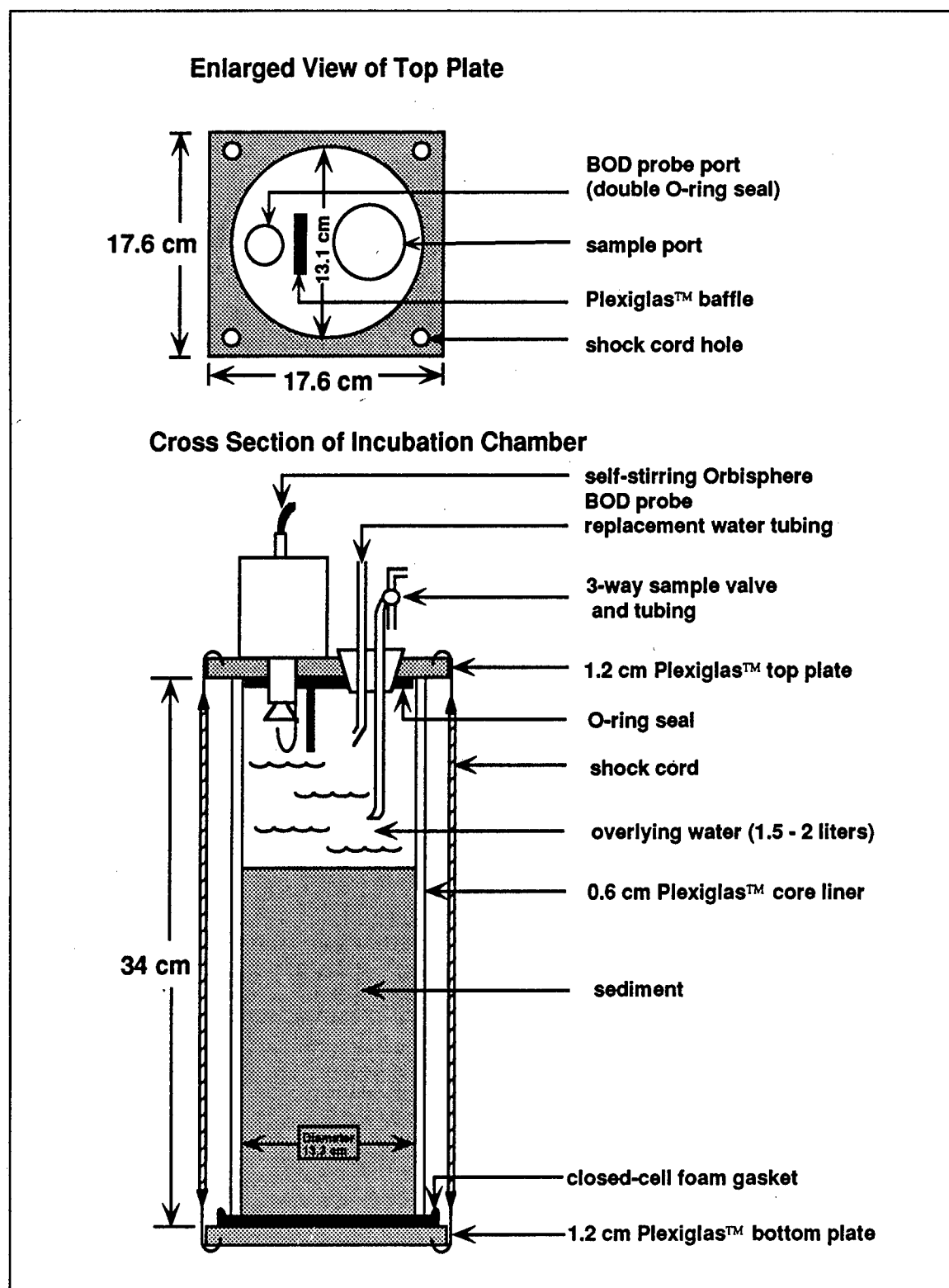


Figure 2. Schematic diagram of incubation chamber

large macro fauna or cracks in the sediments surface, and for proper core height. If the core is satisfactory, the microcosm is equipped with an O-ring sealed top containing ports for probes and water column sampling plus a neoprene gasket sealed bottom. The sealed microcosms are placed in a darkened bottom water-filled holding tank until all of the necessary cores are acquired.

A fourth microcosm is filled with bottom water (but no sediment) to serve as a blank. The blank receives the exact same treatment as the cores with sediments. Fluxes recorded from the bottom water blank microcosm are subtracted from the fluxes obtained in the sediment core microcosms to remove any possible water column-only chemical and biological reactions from the final flux calculations.

Immediately prior to beginning the actual flux incubation, the overlying water in each microcosm (including the blank) is slowly replaced with fresh bottom water to ensure that the water quality conditions in each core closely resemble in situ conditions. (Note: in situ conditions are determined by the CTD water column profile and the bottom water sample, which is analyzed for the same compounds measured during the flux experiment.)

The microcosms are placed in a darkened, temperature-controlled circulating water bath to maintain in situ temperature and light conditions. An oxygen probe containing a stirring device is inserted into one of the ports on the top of each microcosm. The stirring device ensures gentle circulation without sediment resuspension in the microcosm. Another port in each microcosm top is fitted with a device used to sample the overlying water while leaving the microcosm completely sealed.

The microcosms are incubated for 4 hr. Every hour, oxygen concentrations are recorded, plus overlying water samples are extracted to measure the various compound concentrations. (Note: as a water sample is extracted, an equal amount of bottom water from a reservoir is simultaneously pulled into the microcosm.

At each WES station, extracted overlying water samples were immediately filtered, frozen, then later analyzed for  $\text{NH}_4^+$ ,  $\text{NO}_3^- + \text{NO}_2^-$ ,  $\text{PO}_4^{3-}$ ,  $\text{Si(OH)}_4$ , DON, DOP, and DOC. Whole water samples were extracted for total  $\text{CO}_2$ , Fe, and Mn fluxes. Each sample for total carbon dioxide analysis was slowly injected into a small BOD bottle, fixed with mercuric chloride, sealed with the BOD cap, then water sealed. These samples were stored on board in coolers at room temperature. Overlying water samples for iron and manganese analyses were injected into AA vials (5 ml per vial) then fixed with ultra pure nitric acid ( $3 \mu\text{l HNO}_3$  per milliliter of sample). These samples were stored at room temperature.

The overlying water pH was measured at each time point using a Hanna Piccolo pH meter.

All of these fluxes are estimated by calculating the mean rate of change in concentration over the incubation period, correcting for dilution, and converting the volumetric rate to a flux using the volume:area ratio of each core.

In situ methane fluxes were measured by Dr. Sampou. A brief description of the field and laboratory methods follows. For a more in-depth description, see Martens and Klump (1980).

An inverted polypropylene cone (0.086-m<sup>2</sup> area) is suspended in the water column near each station (at the same station depth) approximately 1 m off the bottom. The cone was weighted with 72 oz (2,041 g) of lead and is tethered to a surface float. The hanging depth of the cone is adjustable. The length of the line from the anchor to the surface float is roughly two times the water column depth.

These methane traps were suspended over the sediment for approximately 24 hr (encompassing two low tides when gas ebullition may be affected by hydrostatic head change). Using a gas-tight 10-ml Hamilton syringe, a 5- to 10-ml subsample of the total gas captured in the cone is extracted. This subsample, in the syringe, is transported back to the laboratory and immediately analyzed for methane using a Shimadzu (model GC-8A) gas chromatograph equipped with a thermal conductivity detector (detection limit: 1-percent methane). Prior to sample analysis, five standards were run on the gas chromatograph using pure methane plus atmospheric gas mixtures. Quality control is better than plus/minus 3 percent for the standards. The precision of the traps is calculated to be between 20 and 50 percent due to the heterogeneity of methane ebullition inherent in sediments.

The methane flux calculation follows: (volume of trapped gas) (percent of methane gas) (1 mole of gas/22.4 l) (core area/square meter) (1/incubation time hours).

## 4 Chemical Analyses

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Standard oceanographic and estuarine methods of chemical analysis were used for all determinations of dissolved and particulate materials (see Table 3).

| <b>Table 3</b><br><b>Numerical Water Quality and Contaminant Modeling (EL-22) Tidal Fresh Potomac River and Maryland Main Stem Analyses Problem Codes: Codes and Description</b> |  |
|--|--|
| <b>Code</b>  | <b>Description of Problem</b>                          |
| HH   | Sample Not Taken                                       |
| NI   | Data for This Variable Are Considered Noninterpretable |
| NS   | Data for This Variable Are Considered Nonsignificant   |
| S  | Sample Container Broken During Analysis                |

Analyses performed by NASL, Chesapeake Biological Laboratory, used the following techniques:

- a. Nitrate ( $\text{NO}_3^-$ ) + nitrite ( $\text{NO}_2^-$ ), nitrite ( $\text{NO}_2^-$ ), ammonia ( $\text{NH}_4^+$ ), and dissolved inorganic phosphorus (DIP) followed the procedure of the U.S. Environmental Protection Agency (EPA), EPA-600/4-79-020 (1979).
- b. Siliceous acid ( $\text{Si}(\text{OH})_4$ ) followed the procedure of Technicon Industrial System (1977).
- c. Dissolved organic carbon (DOC) using automated persulfate digestion (Menzel and Vaccaro 1964).
- d. Dissolved organic nitrogen (DON) and dissolved organic phosphorus (DOP): subtraction of inorganic N and P from the total dissolved concentrations of N and P which were obtained by a persulfate oxidation technique (D'Elia, Steudler, and Corwin 1977 and Valderrama 1981).

- e.* Particulate phosphorus (PP) using acid digestion of muffled-dry samples (Aspila, Agemian, and Chau 1976).
- f.* Particulate carbon (PC) and particulate nitrogen (PN) analyses used high temperature combustion with a model 240B Perkin-Elmer Elemental Analyzer (Zimmerman, Keefe, and Bashe 1992).
- g.* Chlorophyll-*a* analysis utilized acetone extraction followed by fluorometric detection (Strickland and Parsons 1972; Shoaf and Lium 1976).
- h.* Pore water carbonate alkalinity (Alk) via acidification and detection with O.I. model 700 carbon analyzer (Menzel and Vaccaro 1964).

Analyses performed by Dr. Peter Sampou, Horn Point Environmental Laboratory, used the following techniques:

- a.* Sediment calcium carbonate ( $\text{CaCO}_3$ ) using acidification followed by gas chromatography.
- b.* Sulfate ( $\text{SO}_4^{2-}$ ) and chloride (Cl) detection with Dionex Corporation chromatograph and conductivity detection method following the procedures of EPA 600/4-87/026 (1987).
- c.* Total carbon dioxide ( $\text{TCO}_2$ ) using coulometric method of Johnson et al. (1987).
- d.* Ruttenberg phosphorus extraction following the procedures of Ruttenberg (1992).
- e.* Sediment phosphate ( $\text{PO}_4$ ) analyses used acid digestion of muffled-dry samples (Aspila, Agemian, and Chau 1976).
- f.* Biogenic silica (BiSi) followed the wet chemical dissolution technique of Eggimann, Mannheim, and Betzen (1980).
- g.* Iron (Fe) and manganese (Mn) followed the procedures of Canfield (1989).
- h.* Calcium (Ca) utilized flame atomic absorption followed by spectrometric detection (Zimmerman, Keefe, and Bashe 1992).
- i.* Acid volatile sulfide (AVS) and chromate reducible sulfide (CRS) following the procedures of Morse and Cornwell (1987).
- j.* Methane ( $\text{CH}_4$ ) flux analyses used a gas trap and GC analysis with a flame ionization detector.

Analyses performed by Dr. Douglas Capone's laboratory, Chesapeake Biological Laboratory, used the following techniques:

- a.* Hydrogen sulfide ( $\text{H}_2\text{S}$ ) followed the colorimetric technique of Cline (1969).
- b.* Pore water methane ( $\text{CH}_4$ ) and porosity used the methods of Capone and Kiene (1985).

**On Board Measurements:**

- a.* Sediment oxygen demand utilized an Orbisphere 2112 oxygen electrode.
- b.* pH measurements used a pH/ion selective electrode.

## 5 Summary of Major Sediment-Water Fluxes

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Graphic summaries of the major fluxes observed are provided to show seasonal patterns and to give an overall indication of the magnitude of sediment-water oxygen and nutrient exchanges (Figures 3-6). Winter samples were not taken due to low activity during cold weather (below 12 to 15 °C) resulting in low to nonexistent fluxes. Figures are provided for sediment oxygen consumption (SOC), ammonium ( $\text{NH}_4^+$ ), dissolved inorganic phosphate ( $\text{PO}_4^{3-}$ ), and total carbon dioxide ( $\text{TCO}_2$ ). These fluxes are particularly important because the data can be used to infer the types and magnitudes of processes controlling water quality conditions. Graphics are not provided for the following fluxes: pH, nitrite plus nitrate ( $\text{NO}_2^- + \text{NO}_3^-$ ), dissolved silicate ( $\text{Si(OH)}_4$ ), dissolved organic carbon (DOC), dissolved organic nitrogen (DON), total dissolved nitrogen (TDN), dissolved organic phosphorus (DOP), total dissolved phosphorus (TDP), iron (Fe), and manganese (Mn).

### Sediment Oxygen Consumption

Sediment oxygen consumption (SOC) in the tidal fresh Potomac River ranged from  $-0.69 \text{ g O}_2 \text{ m}^{-2} \text{ day}^{-1}$  at Maryland Point in October to  $-2.04$  at Gunston Cove in August. Rates at the Maryland main stem (R 64) ranged from  $0.0 \text{ g O}_2 \text{ m}^{-2} \text{ day}^{-1}$  in August to  $-1.32$  in October. SOC rates at the main stem station appear to follow seasonal peak patterns observed in other areas of the Bay. SOC rates at Potomac River stations peaked later in the season than at the main stem station (Figure 3).

### Ammonium and Phosphate

Ammonium ( $\text{NH}_4^+$ ) fluxes in the Potomac River are moderate to high and comparable with other enriched areas of the Bay (Figure 4). Phosphate ( $\text{PO}_4^{3-}$ ) fluxes were low in comparison with other areas of the Bay (Figure 5). Low rates of phosphate release from sediment is indicative of oxidized sediment. Phosphorus binds to iron under oxic conditions and is released

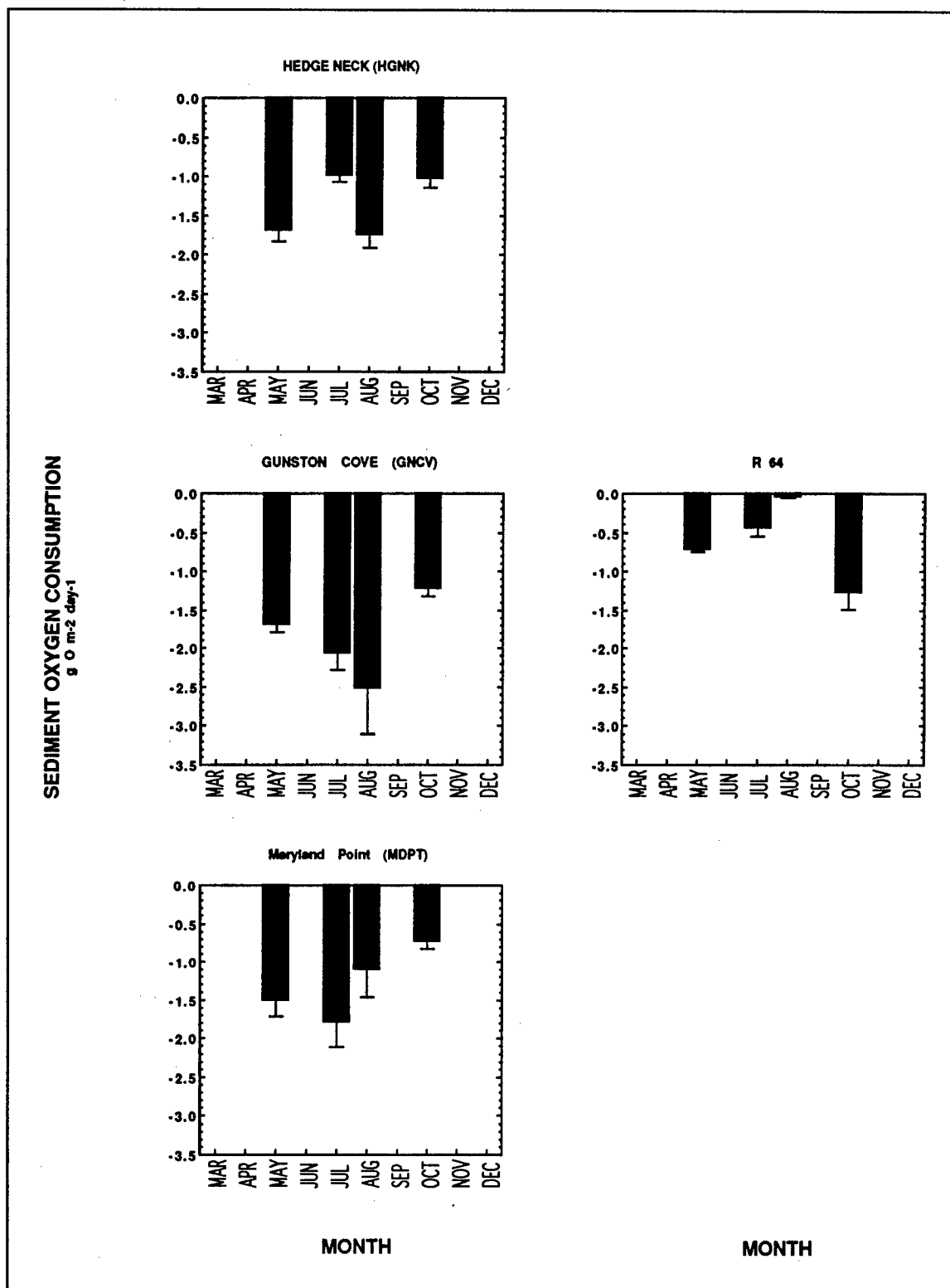


Figure 3. Potomac River and Maryland main stem sediment oxygen consumption rates for 1994

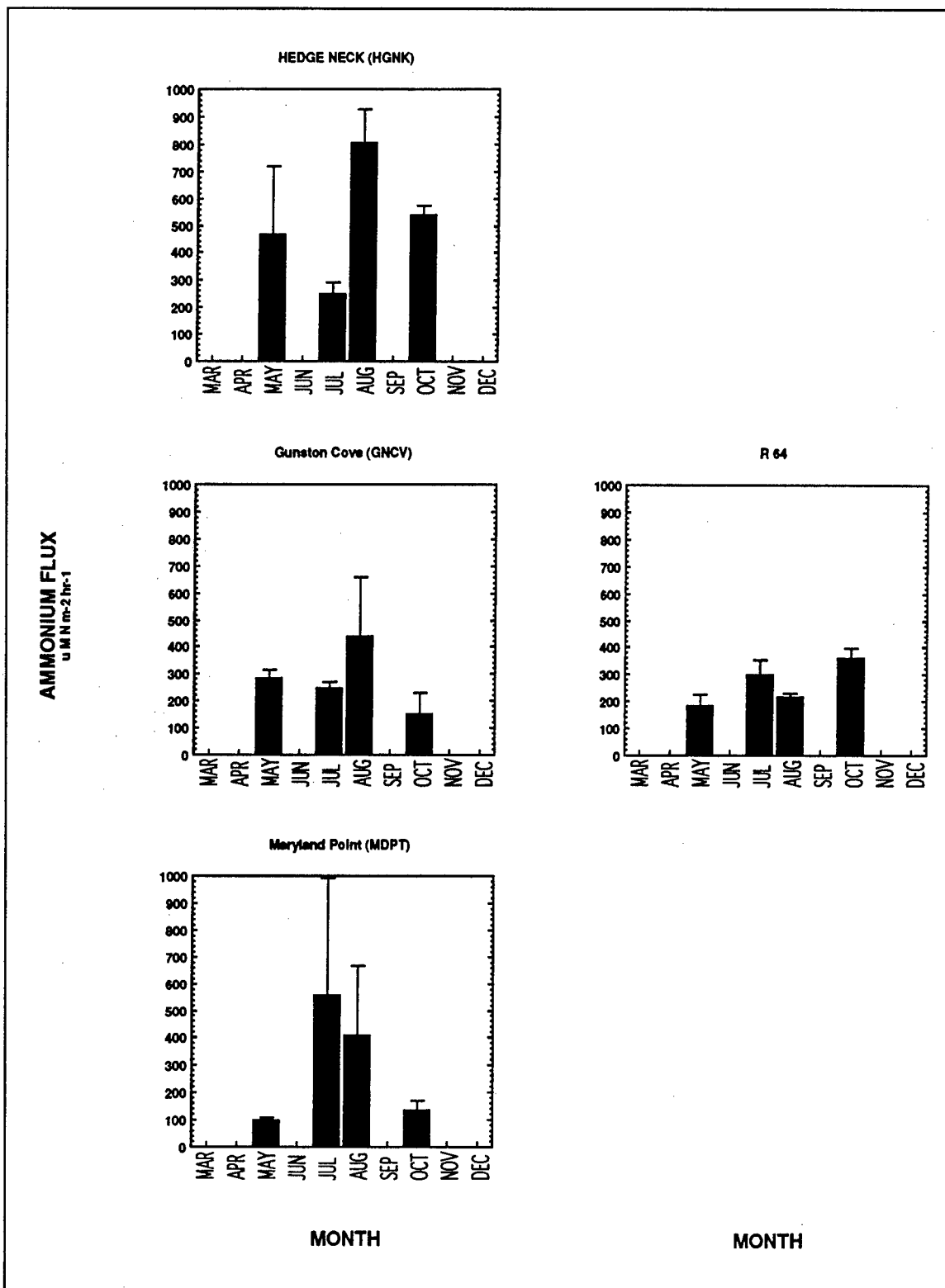


Figure 4. Potomac River and Maryland main stem ammonium flux rates for 1994

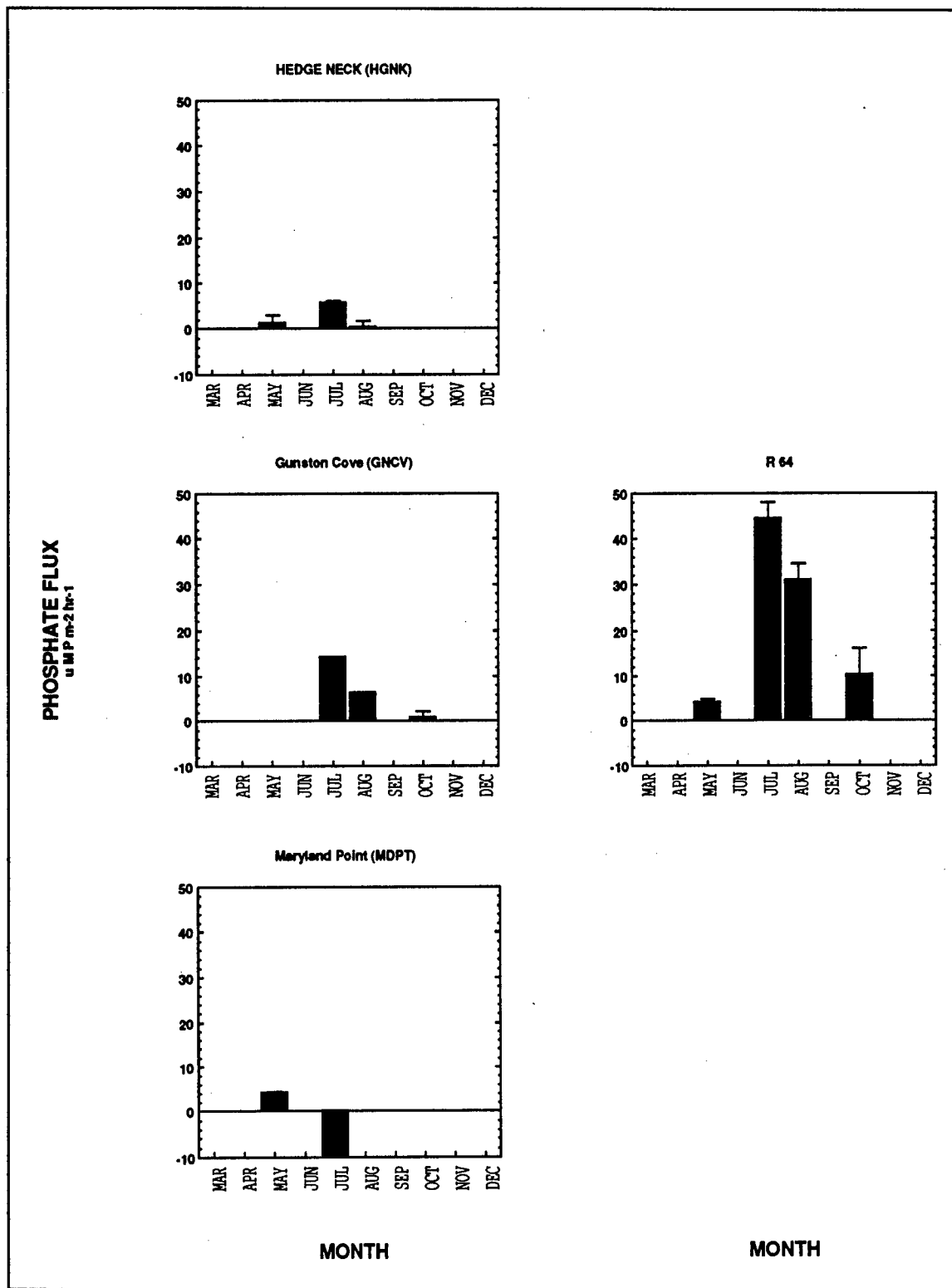


Figure 5. Potomac River and Maryland main stem phosphate flux rates for 1994

under anoxic (reduced) sediment conditions. High bottom water DO measurements and SOC rates support the conclusion that phosphorus is probably bound to iron in Potomac sediments.

## **Total Carbon Dioxide**

Total carbon dioxide ( $\text{TCO}_2$ ) is a tool used to measure total (aerobic and anaerobic) metabolism.  $\text{TCO}_2$  rates in the Potomac were slightly lower than those observed in the Patapsco and Back River systems, two very enriched bay tributaries (Figure 6).  $\text{TCO}_2$  rates followed the same seasonal patterns as SOC rates. When SOC increased, so did  $\text{TCO}_2$ ; when SOC decreased,  $\text{TCO}_2$  decreased as well.

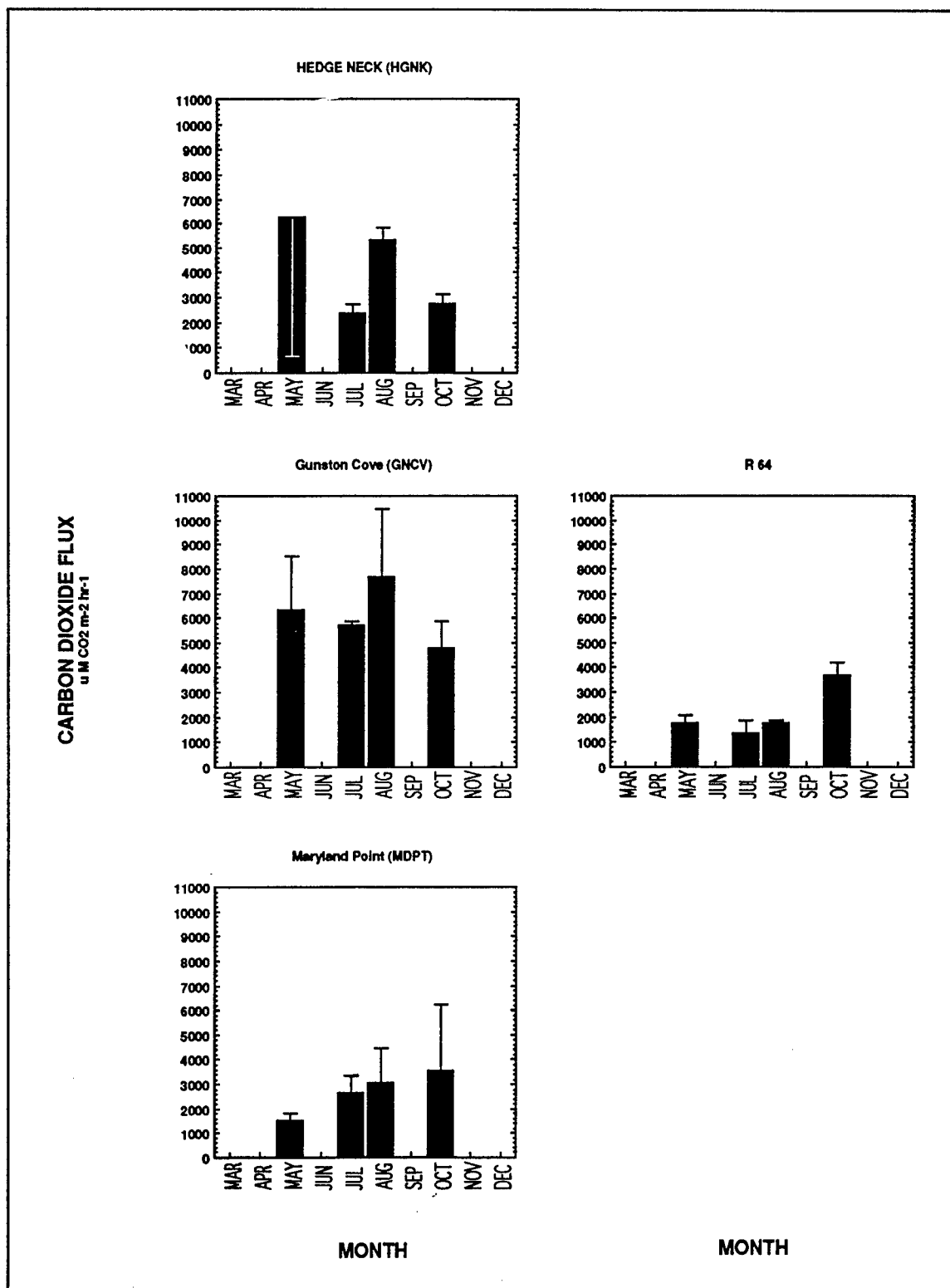


Figure 6. Potomac River and Maryland main stem total carbon dioxide flux rates for 1994

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# **Appendix A**

## **Water Column Profile Data**

### **Tables**

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Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Water Profile: Vertical profile of water characteristics

| STATION | DATE    | TIME | TOTAL<br>DEPTH<br>(m) | SECCHI<br>DEPTH<br>(m) | SAMPLE<br>DEPTH<br>(m) | TEMP<br>(C) | COND<br>(mmho/cm) | SALIN<br>(psu) | DO<br>(mg/L) | DO SAT<br>(%) |
|---------|---------|------|-----------------------|------------------------|------------------------|-------------|-------------------|----------------|--------------|---------------|
| MDPT    | 20MAY94 | 0908 | 10.0                  | 0.5                    | 0.5                    | 18.0        | 0.7               | 0.0            | 8.50         | 89.7          |
|         |         |      |                       |                        | 2.0                    | 18.0        | 0.7               | 0.0            | 8.47         | 89.4          |
|         |         |      |                       |                        | 4.0                    | 18.0        | 0.7               | 0.0            | 8.39         | 88.6          |
|         |         |      |                       |                        | 6.0                    | 18.0        | 0.8               | 0.0            | 8.35         | 88.1          |
|         |         |      |                       |                        | 8.0                    | 17.9        | 0.8               | 0.1            | 8.44         | 89.0          |
|         |         |      |                       |                        | 9.5                    | 17.9        | 0.8               | 0.1            | 8.48         | 89.4          |
| GNCV    | 19MAY94 | 1410 | 3.0                   | 0.6                    | 0.5                    | 16.9        | 0.4               | 0.0            | 9.50         | 98.0          |
|         |         |      |                       |                        | 1.0                    | 16.9        | 0.4               | 0.0            | 9.48         | 97.8          |
|         |         |      |                       |                        | 2.5                    | 16.9        | 0.4               | 0.0            | 9.51         | 98.2          |
| HGK     | 19MAY94 | 0900 | 5.0                   | 0.7                    | 0.5                    | 16.4        | 0.5               | 0.0            | 9.69         | 98.8          |
|         |         |      |                       |                        | 1.0                    | 16.3        | 0.5               | 0.0            | 9.65         | 98.3          |
|         |         |      |                       |                        | 2.0                    | 16.3        | 0.5               | 0.0            | 9.70         | 98.9          |
|         |         |      |                       |                        | 3.0                    | 16.4        | 0.5               | 0.0            | 9.72         | 99.1          |
|         |         |      |                       |                        | 4.5                    | 16.3        | 0.5               | 0.0            | 9.70         | 98.9          |
| R-64    | 21MAY94 | 0915 | 17.0                  | 2.5                    | 0.5                    | 15.6        | 11.0              | 6.0            | 9.98         | 103.8         |
|         |         |      |                       |                        | 2.0                    | 15.5        | 11.0              | 6.0            | 10.10        | 104.9         |
|         |         |      |                       |                        | 4.0                    | 15.5        | 11.1              | 6.0            | 9.75         | 101.2         |
|         |         |      |                       |                        | 6.0                    | 15.6        | 11.4              | 6.2            | 9.69         | 100.9         |
|         |         |      |                       |                        | 8.0                    | 15.5        | 12.3              | 6.8            | 9.35         | 97.7          |
|         |         |      |                       |                        | 10.0                   | 15.7        | 16.1              | 9.2            | 7.82         | 83.2          |
|         |         |      |                       |                        | 12.0                   | 16.1        | 20.1              | 11.8           | 6.04         | 65.8          |
|         |         |      |                       |                        | 14.0                   | 16.1        | 23.3              | 13.9           | 5.04         | 55.6          |
|         |         |      |                       |                        | 16.5                   | 15.8        | 24.2              | 14.5           | 4.01         | 44.2          |

Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Water Profile: Vertical profile of water characteristics

| STATION | DATE    | TIME | TOTAL<br>DEPTH<br>(m) | SECCHI<br>DEPTH<br>(m) | SAMPLE<br>DEPTH<br>(m) | TEMP<br>(C) | COND<br>(mmho/cm) | SALIN<br>(psu) | DO<br>(mg/L) | DO SAT<br>(%) |
|---------|---------|------|-----------------------|------------------------|------------------------|-------------|-------------------|----------------|--------------|---------------|
| MDPT    | 13JUL94 | 1025 | 10.1                  | 0.6                    | 0.5                    | 28.7        | 5.9               | 2.9            | 6.10         | 80.2          |
|         |         |      |                       |                        | 2.0                    | 28.5        | 5.9               | 3.0            | 5.85         | 76.7          |
|         |         |      |                       |                        | 4.0                    | 28.5        | 6.2               | 3.1            | 5.32         | 69.8          |
|         |         |      |                       |                        | 6.0                    | 28.5        | 6.4               | 3.2            | 5.25         | 68.9          |
|         |         |      |                       |                        | 8.0                    | 28.4        | 6.4               | 3.3            | 5.00         | 65.6          |
|         |         |      |                       |                        | 9.5                    | 28.4        | 6.6               | 3.4            | 4.98         | 65.3          |
| GNCV    | 12JUL94 | 1404 | 3.0                   | 0.4                    | 0.5                    | 29.8        | 0.6               | 0.0            | 10.23        | 134.8         |
|         |         |      |                       |                        | 1.0                    | 29.7        | 0.6               | 0.0            | 9.72         | 127.9         |
|         |         |      |                       |                        | 2.0                    | 29.6        | 0.6               | 0.0            | 9.86         | 129.7         |
| HGNK    | 12JUL94 | 0955 | 5.4                   | 0.6                    | 0.5                    | 29.5        | 0.6               | 0.0            | 8.12         | 106.5         |
|         |         |      |                       |                        | 2.0                    | 29.4        | 0.6               | 0.0            | 7.84         | 102.7         |
|         |         |      |                       |                        | 3.0                    | 29.4        | 0.6               | 0.0            | 7.94         | 104.1         |
|         |         |      |                       |                        | 4.0                    | 29.4        | 0.6               | 0.0            | 8.70         | 114.1         |
| R-64    | 14JUL94 | 1030 | 16.5                  | 2.4                    | 0.5                    | 28.3        | 15.1              | 8.6            | 8.40         | 113.2         |
|         |         |      |                       |                        | 2.0                    | 28.1        | 15.2              | 8.6            | 8.45         | 113.5         |
|         |         |      |                       |                        | 4.0                    | 28.0        | 15.6              | 8.9            | 7.83         | 105.2         |
|         |         |      |                       |                        | 6.0                    | 27.3        | 16.8              | 9.7            | 5.00         | 66.7          |
|         |         |      |                       |                        | 8.0                    | 25.7        | 21.0              | 12.4           | 1.32         | 17.4          |
|         |         |      |                       |                        | 10.0                   | 23.7        | 24.3              | 14.6           | 0.15         | 1.9           |
|         |         |      |                       |                        | 12.0                   | 23.3        | 26.2              | 15.9           | 0.12         | 1.5           |
|         |         |      |                       |                        | 14.0                   | 23.3        | 26.8              | 16.3           | 0.13         | 1.7           |
|         |         |      |                       |                        | 16.0                   | 23.2        | 27.6              | 16.8           | 0.16         | 2.1           |

Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Water Profile: Vertical profile of water characteristics

| STATION | DATE    | TIME | TOTAL<br>DEPTH<br>(m) | SECCHI<br>DEPTH<br>(m) | SAMPLE<br>DEPTH<br>(m) | TEMP<br>(C) | COND<br>(mmho/cm) | SALIN<br>(psu) | DO<br>(mg/L) | DO SAT<br>(%) |
|---------|---------|------|-----------------------|------------------------|------------------------|-------------|-------------------|----------------|--------------|---------------|
| MDPT    | 10AUG94 | 1000 | 10.5                  | 0.5                    | 0.5                    | 26.7        | 6.5               | 3.3            | 6.74         | 85.7          |
|         |         |      |                       |                        | 2.0                    | 26.6        | 6.4               | 3.3            | 6.68         | 84.9          |
|         |         |      |                       |                        | 4.0                    | 26.7        | 7.0               | 3.6            | 6.30         | 80.3          |
|         |         |      |                       |                        | 6.0                    | 26.8        | 7.6               | 3.9            | 5.97         | 76.3          |
|         |         |      |                       |                        | 8.0                    | 26.8        | 7.8               | 4.1            | 5.96         | 76.3          |
|         |         |      |                       |                        | 10.0                   | 26.8        | 7.9               | 4.1            | 5.82         | 74.6          |
| GNCV    | 9AUG94  | 1240 | 3.4                   | 0.4                    | 0.5                    | 27.0        | 0.6               | 0.0            | 10.90        | 136.9         |
|         |         |      |                       |                        | 1.0                    | 27.0        | 0.6               | 0.0            | 10.80        | 135.5         |
|         |         |      |                       |                        | 2.0                    | 26.9        | 0.6               | 0.0            | 11.10        | 139.2         |
| HGNK    | 9AUG94  | 0923 | 4.0                   | 0.5                    | 0.5                    | 26.5        | 0.7               | 0.0            | 8.13         | 101.1         |
|         |         |      |                       |                        | 2.0                    | 26.5        | 0.7               | 0.0            | 8.05         | 100.1         |
|         |         |      |                       |                        | 3.0                    | 26.4        | 0.7               | 0.0            | 8.35         | 103.7         |
| R-64    | 11AUG94 | 1015 | 17.6                  | 1.9                    | 0.5                    | 26.3        | 17.8              | 10.3           | 8.20         | 107.7         |
|         |         |      |                       |                        | 2.0                    | 26.3        | 17.8              | 10.3           | 8.07         | 106.0         |
|         |         |      |                       |                        | 4.0                    | 26.2        | 17.8              | 10.3           | 7.88         | 103.4         |
|         |         |      |                       |                        | 6.0                    | 26.2        | 18.2              | 10.6           | 6.41         | 84.2          |
|         |         |      |                       |                        | 8.0                    | 26.1        | 20.9              | 12.3           | 2.22         | 29.4          |
|         |         |      |                       |                        | 10.0                   | 25.9        | 26.0              | 15.7           | 0.10         | 1.3           |
|         |         |      |                       |                        | 12.0                   | 25.6        | 28.8              | 17.7           | 0.10         | 1.4           |
|         |         |      |                       |                        | 14.0                   | 25.5        | 30.3              | 18.7           | 0.10         | 1.4           |
|         |         |      |                       |                        | 16.0                   | 25.3        | 31.7              | 19.7           | 0.10         | 1.4           |

Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Water Profile: Vertical profile of water characteristics

| STATION | DATE    | TIME | TOTAL<br>DEPTH<br>(m) | SECCHI<br>DEPTH<br>(m) | SAMPLE<br>DEPTH<br>(m) | TEMP<br>(C) | COND<br>(mmho/cm) | SALIN<br>(psu) | DO<br>(mg/L) | DO SAT<br>(%) |
|---------|---------|------|-----------------------|------------------------|------------------------|-------------|-------------------|----------------|--------------|---------------|
| MDPT    | 14OCT94 | 0957 | 9.5                   | 0.7                    | 0.5                    | 17.8        | 6.8               | 3.5            | 7.88         | 84.6          |
|         |         |      |                       |                        | 2.0                    | 17.9        | 7.1               | 3.6            | 7.80         | 83.9          |
|         |         |      |                       |                        | 4.0                    | 17.9        | 7.1               | 3.7            | 7.78         | 83.8          |
|         |         |      |                       |                        | 6.0                    | 17.9        | 7.7               | 4.0            | 7.76         | 83.8          |
|         |         |      |                       |                        | 8.0                    | 18.0        | 7.7               | 4.0            | 7.74         | 83.6          |
|         |         |      |                       |                        | 9.0                    | 18.1        | 8.7               | 4.6            | 7.75         | 84.2          |
| GNCV    | 13OCT94 | 1210 | 3.3                   | 0.4                    | 0.5                    | 17.6        | 0.6               | 0.0            | 10.12        | 105.9         |
|         |         |      |                       |                        | 1.0                    | 17.6        | 0.6               | 0.0            | 10.14        | 106.1         |
|         |         |      |                       |                        | 1.5                    | 17.5        | 0.6               | 0.0            | 10.25        | 107.0         |
|         |         |      |                       |                        | 2.0                    | 17.7        | 0.6               | 0.0            | 10.35        | 108.4         |
| HGK     | 13OCT94 | 0855 | 5.5                   | 0.7                    | 0.5                    | 17.5        | 0.7               | 0.0            | 8.42         | 88.0          |
|         |         |      |                       |                        | 2.0                    | 17.5        | 0.7               | 0.0            | 8.42         | 88.0          |
|         |         |      |                       |                        | 4.0                    | 17.5        | 0.7               | 0.0            | 8.49         | 88.8          |
|         |         |      |                       |                        | 5.0                    | 17.5        | 0.7               | 0.0            | 8.67         | 90.6          |
| R-64    | 17OCT94 | 1436 | 16.0                  | 2.3                    | 0.5                    | 17.6        | 24.0              | 14.4           | 8.53         | 97.4          |
|         |         |      |                       |                        | 2.0                    | 17.6        | 24.2              | 14.5           | 8.44         | 96.4          |
|         |         |      |                       |                        | 4.0                    | 17.4        | 24.9              | 15.0           | 8.43         | 96.2          |
|         |         |      |                       |                        | 6.0                    | 17.3        | 25.6              | 15.5           | 8.58         | 98.0          |
|         |         |      |                       |                        | 8.0                    | 17.4        | 25.8              | 15.6           | 8.26         | 94.5          |
|         |         |      |                       |                        | 10.0                   | 17.4        | 25.9              | 15.7           | 8.23         | 94.2          |
|         |         |      |                       |                        | 12.0                   | 17.6        | 26.2              | 15.9           | 8.00         | 92.0          |
|         |         |      |                       |                        | 14.0                   | 18.3        | 27.0              | 16.4           | 6.79         | 79.5          |
|         |         |      |                       |                        | 15.0                   | 18.3        | 27.0              | 16.4           | 6.83         | 80.0          |

# **Appendix B**

## **Bottom Water Dissolved Nutrient Data Tables**

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Numerical Water Quality and Contaminant Modeling (EL-22)

Tidal Fresh Potomac River and Maryland Mainstem

Bottom Water Nutrients: Dissolved nutrient concentrations in bottom waters

| STATION | DATE    | TOTAL SAMPLE |           | DEPTH (m) | COFF     |              |          |          |          |          |          |              |            |         | pH   | SO4 (μM) | TCO2 (μM) |
|---------|---------|--------------|-----------|-----------|----------|--------------|----------|----------|----------|----------|----------|--------------|------------|---------|------|----------|-----------|
|         |         | DEPTH (m)    | DEPTH (m) |           | NH4 (μM) | NO2+NO3 (μM) | TDN (μM) | DON (μM) | DIP (μM) | TDP (μM) | DOP (μM) | Si(OH)4 (μM) | DOC (mg/L) | Fe (μM) |      |          |           |
| HGNK    | 19MAY94 | 5.0          | 4.5       | 10.6      | 101.4    | 125.0        | 13.0     | 0.23     | 0.46     | 0.23     | 95.0     | S            | -0.18      | 1.07    | 8.63 | 236.44   | 1387.5    |
| GNCV    | 19MAY94 | 3.0          | 2.5       | 4.2       | 91.5     | 106.0        | 10.3     | 0.24     | 0.58     | 0.34     | 95.4     |              | -0.36      | 0.98    | 7.81 | 24.92    | 1232.1    |
| MDPT    | 20MAY94 | 10.0         | 9.5       | 5.2       | 92.7     | 106.0        | 8.1      | 0.85     | 1.08     | 0.23     | 26.6     |              | 0.72       | 0.62    | 7.84 | 334.94   | 1518.0    |
| R 64    | 21MAY94 | 17.0         | 16.5      | 11.3      | 25.7     | 56.2         | 19.2     | 0.10     | 0.38     | 0.28     | 14.4     |              | 1.97       | 1.38    | 7.28 | 11065.86 | 1499.3    |
| HGNK    | 12JUL94 | 5.4          | 4.0       | 5.8       | 91.2     | 125.0        | 28.0     | 0.56     | 1.07     | 0.51     | 2.6      |              | 0.00       | 0.03    | 7.67 | 366.17   | HH        |
| GNCV    | 12JUL94 | 3.0          | 2.0       | 0.4       | 47.7     | 72.6         | 24.5     | 0.69     | 1.39     | 0.70     | 0.7      |              | 0.00       | 0.02    | 8.62 | 313.00   | 1506.7    |
| MDPT    | 13JUL94 | 10.1         | 9.5       | 5.4       | 26.9     | 50.3         | 18.0     | 1.71     | 1.85     | 0.14     | 63.3     |              | 0.00       | 0.16    | 7.34 | 2689.21  | 1285.2    |
| R 64    | 14JUL94 | 16.5         | 16.0      | 26.0      | 0.1      | 48.4         | 22.3     | 1.45     | 1.81     | 0.36     | 39.1     |              | 0.00       | 0.00    | 7.22 | 7270.80  | 1687.7    |

Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Bottom Water Nutrients: Dissolved nutrient concentrations in bottom waters

| STATION | DATE    | TOTAL SAMPLE |              | CCHR                    |  |             |             |            |             |             |                             |               |            | pH         | SO <sub>4</sub><br>(μM) | TCO <sub>2</sub><br>(μM) |
|---------|---------|--------------|--------------|-------------------------|--|-------------|-------------|------------|-------------|-------------|-----------------------------|---------------|------------|------------|-------------------------|--------------------------|
|         |         | DEPTH<br>(m) | DEPTH<br>(m) | NH <sub>4</sub><br>(μM) | NO <sub>2</sub> +NO <sub>3</sub><br>(μM) | TDN<br>(μM) | DON<br>(μM) | DP<br>(μM) | TDP<br>(μM) | DOP<br>(μM) | SI(OH) <sub>4</sub><br>(μM) | DOC<br>(mg/L) | Fe<br>(μM) | Mn<br>(μM) |                         |                          |
| HGK     | 9AUG94  | 4.0          | 3.0          | 4.7                     | 109.2                                    | 137.6       | 23.7        | 0.37       | 0.75        | 0.38        | 10.9                        | 3.63          | 0.00       | 0.53       | 7.61                    | 375.35 1716              |
| GNCV    | 9AUG94  | 3.4          | 2.0          | 0.4                     | 59.8                                     | 79.6        | 19.4        | 0.62       | 0.92        | 0.30        | 3.0                         | 3.82          | 0.00       | 0.49       | 8.37                    | 398.22 1502              |
| MDPT    | 10AUG94 | 10.5         | 10.0         | 3.7                     | 9.1                                      | 34.0        | 21.2        | 1.85       | 2.17        | 0.32        | 49.8                        | 3.17          | 0.00       | 0.62       | 7.24                    | 3430.60 1259             |
| R 64    | 11AUG94 | 17.6         | 16.0         | 26.0                    | 0.2                                      | 49.8        | 23.6        | 2.50       | 2.88        | 0.38        | 44.5                        | 1.94          | 5.19       | 0.58       | 7.18                    | 15644.68 1880            |
| HGK     | 13OCT94 | 5.5          | 5.0          | 12.4                    | 202.0                                    | 241.0       | 26.6        | 0.35       | 0.67        | 0.32        | 47.3                        | 3.13          | 0.00       | 0.00       | 7.49                    | 407.88 1932              |
| GNCV    | 13OCT94 | 3.3          | 2.0          | 0.6                     | 139.0                                    | 163.0       | 23.4        | 0.15       | 0.48        | 0.33        | 27.1                        | 3.42          | 0.00       | 0.00       | 8.19                    | 322.89 1645              |
| MDPT    | 14OCT94 | 9.5          | 9.0          | 7.6                     | 39.6                                     | 68.9        | 21.7        | 1.75       | 2.04        | 0.29        | 44.6                        | 3.63          | 0.00       | 0.00       | 7.46                    | 3625.45 1454             |
| R 64    | 17OCT94 | 16.0         | 15.0         | 4.8                     | 1.9                                      | 32.5        | 25.8        | 0.11       | 0.40        | 0.29        | 33.6                        | 2.24          | 0.00       | 0.00       | 7.77                    | 12516.7 1637             |

**Appendix C**  
**Sediment Samples: Solid Phase**  
**(0-10 cm) Data Tables;**  
**Dissolved Phase (0-10 cm) Data**  
**Tables**

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Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Surficial Sediments: Surficial sediment characteristics

| STATION | DATE    | SED<br>FC<br>%(wt) | SED<br>FN<br>%(wt) | SED<br>FP<br>%(wt) | SED CHLa<br>TOTAL<br>(mg/m2) | SED CHLa<br>ACTIVE<br>(mg/m2) |
|---------|---------|--------------------|--------------------|--------------------|------------------------------|-------------------------------|
| HGNK    | 19MAY94 | 4.18               | 0.34               | 0.087              | 13.4                         | 7.1                           |
| GNCV    | 19MAY94 | 3.22               | 0.26               | 0.072              | 10.9                         | 5.5                           |
| MDPT    | 20MAY94 | 2.58               | 0.29               | 0.093              | 4.6                          | 1.2                           |
| R-64    | 21MAY94 | 2.88               | 0.36               | 0.132              | 15.5                         | 4.6                           |
| HGNK    | 12JUL94 | 3.79               | 0.29               | 0.080              | 17.7                         | 8.9                           |
| GNCV    | 12JUL94 | 3.83               | 0.26               | 0.080              | 13.9                         | 7.0                           |
| MDPT    | 13JUL95 | 2.45               | 0.27               | 0.120              | 8.4                          | 1.8                           |
| R-64    | 14JUL95 | 2.66               | 0.32               | 0.040              | 13.9                         | 5.1                           |
| HGNK    | 9AUG95  | 3.59               | 0.30               | 0.100              | 12.9                         | 5.5                           |
| GNCV    | 9AUG95  | 3.51               | 0.24               | 0.059              | 13.6                         | 6.2                           |
| MDPT    | 10AUG95 | 2.38               | 0.26               | 0.097              | 9.2                          | 2.5                           |
| R-64    | 11AUG95 | 2.72               | 0.33               | 0.050              | 13.9                         | 5.4                           |
| HGNK    | 13OCT95 | 3.75               | 0.32               | 0.120              | 5.8                          | 2.1                           |
| GNCV    | 13OCT95 | 3.00               | 0.23               | 0.080              | 8.5                          | 3.0                           |
| MDPT    | 14OCT95 | 2.48               | 0.26               | 0.140              | 5.3                          | 1.2                           |
| R-64    | 17OCT95 | 3.09               | 0.37               | 0.050              | 9.2                          | 2.8                           |

Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Pore Water: Nutrient concentrations in sediment pore water

| STATION | DATE    | AA<br>VIAL<br># | NH4<br>( $\mu$ M) | NO2+NO3<br>( $\mu$ M) | DP<br>( $\mu$ M) | SI(OH)4<br>( $\mu$ M) | DOC<br>VIAL<br># | DOC<br>(mg/L) | ALK<br>(mg CaCO3/L) | DON/DOP<br>VIAL<br># | DON<br>( $\mu$ g/L) | DOP<br>( $\mu$ g/L) | pH   |
|---------|---------|-----------------|-------------------|-----------------------|------------------|-----------------------|------------------|---------------|---------------------|----------------------|---------------------|---------------------|------|
| HGK     | 19MAY94 | 211             | 2126              | 0.53                  | 0.09             | 213.7                 | R39              | 24.2          | 1360.0              | 39                   | -40.53              | -0.05               | 7.27 |
| GNCV    | 19MAY94 | 212             | 1283              | 0.33                  | 0.14             | 276.8                 | R44              | 25.0          | 1650.0              | 44                   | 90.67               | -0.09               | 7.31 |
| MDPT    | 20MAY94 | 234             | 172               | 0.48                  | 12.80            | 220.5                 | R66              | 17.7          | 250.8               | 66                   | 275.32              | 2.90                | 7.47 |
| R-64    | 21MAY94 | 235             | 356               | 1.81                  | 33.40            | 455.9                 | R88              | 6.0           | 475.8               | 88                   | 32.59               | 46.90               | 6.97 |
| HGK     | 12JUL94 | 211             | 1906              | 0.33                  | 0.29             | 379.6                 | G19              | 21.4          | 1079.2              | Y43                  | -301.33             | 0.51                | 6.87 |
| GNCV    | 12JUL94 | 212             | 1542              | 0.25                  | 2.05             | 366.4                 | G21              | 18.9          | 1175.0              | Y44                  | -99.25              | -1.15               | 6.91 |
| MDPT    | 13JUL94 | 402             | 522               | 6.08                  | 0.90             | 329.4                 | G43              | 10.1          | 266.7               | Y66                  | 26.92               | 12.70               | 7.19 |
| R-64    | 14JUL94 | 98              | 243               | 110.00                | 0.34             | 653.4                 | G65              | 14.4          | 629.2               | Y88                  | 78.30               | 94.06               | 7.30 |
| HGK     | 9AUG94  | 208             | 1834              | 2.71                  | 0.32             | 374.0                 | 49               | 18.0          | 1106.7              | 36                   | -177.71             | -0.13               | 6.65 |
| GNCV    | 9AUG94  | 203             | 1326              | 0.28                  | 0.27             | 429.0                 | 44               | 15.1          | 730.0               | 31                   | 20.72               | 0.39                | 6.75 |
| MDPT    | 10AUG94 | 234             | 416               | 0.31                  | 4.41             | 280.0                 | 79               | 6.8           | 295.0               | 66                   | 25.69               | 1.73                | 6.81 |
| R-64    | 11AUG94 | 106             | 802               | 1.40                  | 146.00           | 817.0                 | 16               | 14.6          | 1120.0              | 88                   | -257.40             | 26.00               | 7.21 |
| HGK     | 13OCT94 | 209             | 3780              | 0.28                  | 0.39             | 385.0                 | 36               | 23.9          | 1287.5              | 36                   | -765.28             | 0.55                | 6.75 |
| GNCV    | 13OCT94 | 204             | 1930              | 1.52                  | 0.22             | 365.0                 | 35               | 18.7          | 1184.2              | 35                   | -247.52             | -0.20               | 6.83 |
| MDPT    | 14OCT94 | 235             | 1380              | 0.46                  | 5.09             | 222.0                 | 66               | 8.9           | 335.0               | 66                   | -855.46             | 0.54                | 7.04 |
| R-64    | 17OCT94 | 236             | 495               | 0.52                  | 193.00           | 704.0                 | 88               | 22.8          | 1580.0              | 88                   | 307.48              | 64.00               | 7.39 |

Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Hydrogen Sulfide: Vertical profile of free hydrogen sulfide in sediment

| STATION | MONTH | SEDIMENT<br>DEPTH<br>(cm) | SIDE A*<br>( $\mu$ M) | SIDE B*<br>( $\mu$ M) | AVG H <sub>2</sub> S<br>( $\mu$ M) | STANDARD<br>ERROR |
|---------|-------|---------------------------|-----------------------|-----------------------|------------------------------------|-------------------|
| HGK     | MAY   | 1                         | 1.15                  | 1.91                  | 1.53                               | 0.38              |
|         |       | 3                         | 0.18                  | 1.49                  | 0.83                               | 0.65              |
|         |       | 5                         | 0.51                  | -0.01                 | 0.25                               | 0.26              |
|         |       | 7                         | 0.93                  | 0.65                  | 0.79                               | 0.14              |
|         |       | 9                         | 0.94                  | 0.74                  | 0.84                               | 0.10              |
| GNCV    | MAY   | 1                         | 0.32                  | 0.58                  | 0.45                               | 0.13              |
|         |       | 3                         | 0.46                  | 0.22                  | 0.34                               | 0.12              |
|         |       | 5                         | -0.01                 | -0.01                 | -0.01                              | 0.00              |
|         |       | 7                         | -0.01                 | -0.01                 | -0.01                              | 0.00              |
|         |       | 9                         | -0.25                 | -0.01                 | -0.13                              | 0.12              |
| MDPT    | MAY   | 1                         | 0.69                  | 1.29                  | 0.99                               | 0.30              |
|         |       | 3                         | 2.42                  | 1.96                  | 2.19                               | 0.23              |
|         |       | 5                         | 2.99                  | 1.76                  | 2.38                               | 0.61              |
|         |       | 7                         | 2.98                  | 2.20                  | 2.59                               | 0.39              |
|         |       | 9                         | 4.09                  | 2.00                  | 3.04                               | 1.05              |
| R 64    | MAY   | 1                         | 0.17                  | 0.45                  | 0.31                               | 0.14              |
|         |       | 3                         | 12.58                 | 7.99                  | 10.29                              | 2.30              |
|         |       | 5                         | 227.17                | 181.91                | 204.54                             | 13.10             |
|         |       | 7                         | 508.31                | 662.67                | 585.49                             | 52.82             |
|         |       | 9                         | 923.29                | 1117.73               | 1020.51                            | 73.98             |

\*Note: A core was divided into two halves. Samples were taken from each half, side A and B respectively.

Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Hydrogen Sulfide: Vertical profile of free hydrogen sulfide in sediment

| STATION | MONTH | SEDIMENT<br>DEPTH<br>(cm) | SIDE A*<br>( $\mu$ M) | SIDE B*<br>( $\mu$ M) | AVG H <sub>2</sub> S<br>( $\mu$ M) | STANDARD<br>ERROR |
|---------|-------|---------------------------|-----------------------|-----------------------|------------------------------------|-------------------|
| HGK     | JULY  | 1                         | 1.04                  | 0.95                  | 0.99                               | 0.04              |
|         |       | 3                         | 1.50                  | 0.37                  | 0.94                               | 0.57              |
|         |       | 5                         | 0.65                  | 0.27                  | 0.46                               | 0.19              |
|         |       | 7                         | 0.75                  | 0.47                  | 0.61                               | 0.14              |
|         |       | 9                         | 0.56                  | 0.56                  | 0.66                               | 0.00              |
| GNCV    | JULY  | 1                         | 0.46                  | 0.56                  | 0.51                               | 0.05              |
|         |       | 3                         | 0.36                  | 0.65                  | 0.51                               | 0.15              |
|         |       | 5                         | 0.58                  | 1.03                  | 0.80                               | 0.23              |
|         |       | 7                         | 0.58                  | 0.84                  | 0.71                               | 0.13              |
|         |       | 9                         | 0.34                  | 0.86                  | 0.60                               | 0.26              |
| MDPT    | JULY  | 1                         | 0.22                  | 0.56                  | 0.39                               | 0.17              |
|         |       | 3                         | 9.57                  | 1.97                  | 5.77                               | 3.80              |
|         |       | 5                         | 0.11                  | 0.75                  | 0.43                               | 0.32              |
|         |       | 7                         | 0.34                  | 0.86                  | 0.60                               | 0.26              |
|         |       | 9                         | 3.71                  | 8.65                  | 6.18                               | 2.47              |
| R 64    | JULY  | 1                         | 301.11                | 403.28                | 352.20                             | 51.08             |
|         |       | 3                         | 496.26                | 431.39                | 463.82                             | 32.40             |
|         |       | 5                         | 448.84                | 334.56                | 391.70                             | 57.10             |
|         |       | 7                         | 437.52                | 299.01                | 368.27                             | 69.20             |
|         |       | 9                         | 565.02                | 837.93                | 701.48                             | 136.40            |

\*Note: A core was divided into two halves. Samples were taken from each half, side A and B respectively.

Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Hydrogen Sulfide: Vertical profile of free hydrogen sulfide in sediment

| STATION | MONTH  | SEDIMENT<br>DEPTH<br>(cm) | SIDE A*<br>( $\mu$ M) | SIDE B*<br>( $\mu$ M) | AVG H <sub>2</sub> S<br>( $\mu$ M) | STANDARD<br>ERROR |
|---------|--------|---------------------------|-----------------------|-----------------------|------------------------------------|-------------------|
| HGK     | AUGUST | 1                         | 1.03                  | 1.40                  | 1.22                               | 0.19              |
|         |        | 3                         | 0.74                  | 0.88                  | 0.81                               | 0.07              |
|         |        | 5                         | 0.50                  | 0.64                  | 0.57                               | 0.07              |
|         |        | 7                         | 0.50                  | 0.73                  | 0.61                               | 0.11              |
|         |        | 9                         | 0.79                  | 0.58                  | 0.69                               | 0.11              |
| GNCV    | AUGUST | 1                         | 0.42                  | 0.80                  | 0.61                               | 0.19              |
|         |        | 3                         | 0.72                  | 0.58                  | 0.65                               | 0.07              |
|         |        | 5                         | 0.66                  | 0.51                  | 0.59                               | 0.07              |
|         |        | 7                         | 0.65                  | 0.52                  | 0.59                               | 0.06              |
|         |        | 9                         | 0.88                  | 0.35                  | 0.61                               | 0.27              |
| MDPT    | AUGUST | 1                         | 0.50                  | 0.42                  | 0.46                               | 0.04              |
|         |        | 3                         | 0.42                  | 0.50                  | 0.46                               | 0.04              |
|         |        | 5                         | 0.35                  | 0.58                  | 0.47                               | 0.11              |
|         |        | 7                         | 0.58                  | 0.43                  | 0.50                               | 0.08              |
|         |        | 9                         | 0.43                  | 1.19                  | 0.81                               | 0.38              |
| R 64    | AUGUST | 1                         | 1151.03               | 1025.31               | 1088.17                            | 45.87             |
|         |        | 3                         | 1901.11               | 2021.84               | 1961.47                            | 99.67             |
|         |        | 5                         | 1647.60               | 2028.68               | 1838.14                            | 133.01            |
|         |        | 7                         | 1913.97               | 2273.24               | 2093.60                            | 104.48            |
|         |        | 9                         | 1895.12               | 2054.50               | 1974.81                            | 54.29             |

\*Note: A core was divided into two halves. Samples were taken from each half, side A and B respectively.

Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Hydrogen Sulfide: Vertical profile of free hydrogen sulfide in sediment

| STATION | MONTH   | SEDIMENT<br>DEPTH<br>(cm) | SIDE A*<br>( $\mu$ M) | SIDE B*<br>( $\mu$ M) | AVG H <sub>2</sub> S<br>( $\mu$ M) | STANDARD<br>ERROR |
|---------|---------|---------------------------|-----------------------|-----------------------|------------------------------------|-------------------|
| HGNK    | OCTOBER | 1                         | 1.15                  | 1.54                  | 1.34                               | 0.19              |
|         |         | 3                         | 0.85                  | 0.94                  | 0.90                               | 0.04              |
|         |         | 5                         | 0.85                  | 0.85                  | 0.85                               | 0.00              |
|         |         | 7                         | 1.10                  | 0.93                  | 1.02                               | 0.08              |
|         |         | 9                         | 1.50                  | 0.52                  | 1.01                               | 0.49              |
| GNCV    | OCTOBER | 1                         | 0.69                  | 0.69                  | 0.69                               | 0.00              |
|         |         | 3                         | 0.77                  | 0.86                  | 0.81                               | 0.04              |
|         |         | 5                         | 0.68                  | 0.94                  | 0.81                               | 0.13              |
|         |         | 7                         | 0.60                  | 0.77                  | 0.69                               | 0.08              |
|         |         | 9                         | 0.78                  | 0.94                  | 0.86                               | 0.08              |
| MDPT    | OCTOBER | 1                         | 0.92                  | 0.93                  | 0.92                               | 0.00              |
|         |         | 3                         | 0.92                  | 1.10                  | 1.01                               | 0.09              |
|         |         | 5                         | 1.01                  | 1.74                  | 1.38                               | 0.37              |
|         |         | 7                         | 1.18                  | 0.93                  | 1.05                               | 0.13              |
|         |         | 9                         | 1.02                  | 1.18                  | 1.10                               | 0.08              |
| R 64    | OCTOBER | 1                         | 1315.65               | 2661.12               | 1988.38                            | 409.18            |
|         |         | 3                         | 2000.24               | 4655.34               | 3327.79                            | 797.79            |
|         |         | 5                         | 4559.36               | 5302.87               | 4931.11                            | 1067.89           |
|         |         | 7                         | 3968.64               | 5342.62               | 4655.63                            | 753.60            |
|         |         | 9                         | 3156.96               | 3786.74               | 3471.85                            | 269.08            |

\*Note: A core was divided into halves. Samples were taken from each half, side A and B respectively.

Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Methane: Vertical profile of methane in sediments

| STATION | MONTH | DEPTH<br>(cm) | SIDE A*<br>(mM/Lws)** | SIDE B*<br>(mM/Lws)** | AVG                   | STANDARD<br>DEVIATION | METHANE<br>(mM/m2) | AVERAGE<br>POROSITY | STANDARD<br>DEVIATION |
|---------|-------|---------------|-----------------------|-----------------------|-----------------------|-----------------------|--------------------|---------------------|-----------------------|
|         |       |               |                       |                       | METHANE<br>(mM/Lws)** |                       |                    |                     |                       |
| HGNK    | MAY   | 1             | 0.502                 | 0.092                 | 0.297                 | 0.205                 | 5.95               | 3.475               | 2.475                 |
|         |       | 3             | 1.072                 | 0.758                 | 0.915                 | 0.157                 | 18.30              | 10.650              | 7.650                 |
|         |       | 5             | 1.002                 | 1.533                 | 1.267                 | 0.266                 | 25.35              | 15.175              | 10.175                |
|         |       | 7             | 1.471                 | 1.206                 | 1.339                 | 0.132                 | 26.77              | 16.885              | 9.885                 |
|         |       | 9             | 1.012                 | 1.070                 | 1.041                 | 0.029                 | 20.82              | 14.910              | 5.910                 |
| GNCV    | MAY   | 1             | 0.725                 | 0.604                 | 0.665                 | 0.061                 | 13.29              | 7.145               | 6.145                 |
|         |       | 3             | 1.153                 | 1.203                 | 1.178                 | 0.025                 | 23.55              | 13.275              | 10.275                |
|         |       | 5             | 1.174                 | 1.352                 | 1.263                 | 0.089                 | 25.27              | 15.135              | 10.135                |
|         |       | 7             | 1.373                 | 1.724                 | 1.549                 | 0.175                 | 30.98              | 18.990              | 11.990                |
|         |       | 9             | 1.132                 | 1.644                 | 1.388                 | 0.256                 | 27.77              | 18.385              | 9.385                 |
| MDPT    | MAY   | 1             | 0.020                 | 0.010                 | 0.015                 | 0.005                 | 0.31               | 0.655               | 0.345                 |
|         |       | 3             | 0.033                 | 0.016                 | 0.024                 | 0.008                 | 0.40               | 1.700               | 1.300                 |
|         |       | 5             | 0.087                 | 0.073                 | 0.080                 | 0.007                 | 1.50               | 3.250               | 1.750                 |
|         |       | 7             | 0.161                 | 0.197                 | 0.179                 | 0.018                 | 3.50               | 5.250               | 1.750                 |
|         |       | 9             | 0.368                 | 0.314                 | 0.341                 | 0.027                 | 6.80               | 7.900               | 1.100                 |
| R 64    | MAY   | 1             | 0.004                 | 0.008                 | 0.006                 | 0.002                 | 0.13               | 0.565               | 0.435                 |
|         |       | 3             | 0.009                 | 0.013                 | 0.011                 | 0.002                 | 0.22               | 1.610               | 1.390                 |
|         |       | 5             | 0.020                 | 0.020                 | 0.020                 | 0.000                 | 0.39               | 2.695               | 2.305                 |
|         |       | 7             | 0.025                 | 0.033                 | 0.029                 | 0.004                 | 0.58               | 3.790               | 3.210                 |
|         |       | 9             | 0.037                 | 0.037                 | 0.037                 | 0.000                 | 0.74               | 4.870               | 4.130                 |

\*Note: A core was divided into two halves. Samples were taken from each half, side A and B respectively.

\*\*Note: Lws = liter wet sediment

Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Methane: Vertical profile of methane in sediments

| STATION | MONTH | DEPTH<br>(cm) | SIDE A*<br>(mM/Lws)** | SIDE B*<br>(mM/Lws)** | AVG<br>METHANE<br>(mM/Lws)** | STANDARD<br>DEVIATION | METHANE<br>(mM/m2) | AVERAGE<br>POROSITY | STANDARD<br>DEVIATION |
|---------|-------|---------------|-----------------------|-----------------------|------------------------------|-----------------------|--------------------|---------------------|-----------------------|
| HGNK    | JULY  | 1             | 1.345                 | S                     | 1.345                        | 0.000                 | 26.90              | 13.950              | 12.950                |
|         |       | 3             | 1.095                 | 1.139                 | 1.117                        | 0.022                 | 22.34              | 12.670              | 9.670                 |
|         |       | 5             | 1.321                 | 0.999                 | 1.160                        | 0.161                 | 23.20              | 14.100              | 9.100                 |
|         |       | 7             | 1.355                 | 1.096                 | 1.226                        | 0.129                 | 24.51              | 15.755              | 8.755                 |
|         |       | 9             | 1.165                 | 1.397                 | 1.281                        | 0.116                 | 25.62              | 17.310              | 8.310                 |
| GNCV    | JULY  | 1             | 1.347                 | 2.129                 | 1.738                        | 0.391                 | 34.77              | 17.885              | 16.885                |
|         |       | 3             | 1.192                 | 1.175                 | 1.184                        | 0.008                 | 23.67              | 13.335              | 10.335                |
|         |       | 5             | 4.424                 | 2.162                 | 3.293                        | 1.131                 | 65.86              | 35.430              | 30.430                |
|         |       | 7             | 1.222                 | 1.491                 | 1.357                        | 0.135                 | 27.13              | 17.065              | 10.065                |
|         |       | 9             | 1.137                 | 1.164                 | 1.151                        | 0.013                 | 23.02              | 16.010              | 7.010                 |
| MDPT    | JULY  | 1             | 0.023                 | 0.017                 | 0.020                        | 0.003                 | 0.39               | 0.695               | 0.305                 |
|         |       | 3             | 0.017                 | 0.051                 | 0.034                        | 0.017                 | 0.68               | 1.840               | 1.160                 |
|         |       | 5             | 0.042                 | 0.081                 | 0.061                        | 0.019                 | 1.23               | 3.115               | 1.885                 |
|         |       | 7             | 0.074                 | 0.241                 | 0.158                        | 0.083                 | 3.15               | 5.075               | 1.925                 |
|         |       | 9             | 0.429                 | 0.569                 | 0.499                        | 0.070                 | 9.98               | 9.490               | 0.490                 |
| R 64    | JULY  | 1             | 0.004                 | 0.004                 | 0.004                        | 0.000                 | 0.08               | 0.540               | 0.460                 |
|         |       | 3             | 0.006                 | 0.006                 | 0.006                        | 0.000                 | 0.12               | 1.560               | 1.440                 |
|         |       | 5             | 0.008                 | 0.007                 | 0.008                        | 0.000                 | 0.15               | 2.575               | 2.425                 |
|         |       | 7             | 0.010                 | 0.008                 | 0.009                        | 0.001                 | 0.18               | 3.590               | 3.410                 |
|         |       | 9             | 0.012                 | 0.011                 | 0.012                        | 0.000                 | 0.23               | 4.615               | 4.385                 |

\*Note: A core was divided into two halves. Samples were taken from each half, side A and B respectively.

\*\*Note: Lws = liter wet sediment

Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Methane: Vertical profile of methane in sediments

| STATION | MONTH  | DEPTH<br>(cm) | SIDE A*<br>(mM/Lws)** | SIDE B*<br>(mM/Lws)** | AVG                   |                       | METHANE<br>(mM/m2) | AVERAGE<br>POROSITY | STANDARD<br>DEVIATION |
|---------|--------|---------------|-----------------------|-----------------------|-----------------------|-----------------------|--------------------|---------------------|-----------------------|
|         |        |               |                       |                       | METHANE<br>(mM/Lws)** | STANDARD<br>DEVIATION |                    |                     |                       |
| HGNK    | AUGUST | 1             | 0.506                 | 1.868                 | 1.187                 | 0.681                 | 23.74              | 12.370              | 11.370                |
|         |        | 3             | 1.350                 | 1.374                 | 1.362                 | 0.012                 | 27.24              | 15.120              | 12.120                |
|         |        | 5             | 2.135                 | 1.796                 | 1.965                 | 0.169                 | 39.30              | 22.150              | 17.150                |
|         |        | 7             | 2.137                 | 1.710                 | 1.923                 | 0.214                 | 38.47              | 22.735              | 15.735                |
|         |        | 9             | 1.104                 | 0.965                 | 1.035                 | 0.069                 | 20.69              | 14.845              | 5.845                 |
| GNCV    | AUGUST | 1             | 1.311                 | 0.903                 | 1.107                 | 0.204                 | 22.14              | 11.570              | 10.570                |
|         |        | 3             | 1.191                 | 0.902                 | 1.046                 | 0.145                 | 20.93              | 11.965              | 8.965                 |
|         |        | 5             | 1.009                 | 1.050                 | 1.030                 | 0.021                 | 20.59              | 12.795              | 7.795                 |
|         |        | 7             | 1.099                 | 1.105                 | 1.102                 | 0.003                 | 22.04              | 14.520              | 7.520                 |
|         |        | 9             | 1.135                 | 2.190                 | 1.662                 | 0.527                 | 33.25              | 21.125              | 12.125                |
| MDPT    | AUGUST | 1             | 0.008                 | 0.012                 | 0.010                 | 0.002                 | 0.20               | 0.600               | 0.400                 |
|         |        | 3             | 0.016                 | 0.037                 | 0.027                 | 0.011                 | 0.53               | 1.765               | 1.235                 |
|         |        | 5             | 0.043                 | 0.045                 | 0.044                 | 0.001                 | 0.88               | 2.940               | 2.060                 |
|         |        | 7             | 0.047                 | 0.127                 | 0.087                 | 0.040                 | 1.73               | 4.365               | 2.635                 |
|         |        | 9             | 0.119                 | 0.286                 | 0.203                 | 0.084                 | 4.05               | 6.525               | 2.475                 |
| R 64    | AUGUST | 1             | 0.015                 | 0.011                 | 0.013                 | 0.002                 | 0.25               | 0.625               | 0.375                 |
|         |        | 3             | 0.028                 | 0.027                 | 0.028                 | 0.001                 | 0.55               | 1.775               | 1.225                 |
|         |        | 5             | 0.045                 | 0.044                 | 0.045                 | 0.001                 | 0.89               | 2.945               | 2.055                 |
|         |        | 7             | 0.051                 | 0.068                 | 0.059                 | 0.009                 | 1.19               | 4.095               | 2.905                 |
|         |        | 9             | 0.083                 | 0.089                 | 0.086                 | 0.003                 | 1.72               | 5.360               | 3.640                 |

\*Note: A core was divided into two halves. Samples were taken from each half, side A and B respectively.

\*\*Note: Lws = liter wet sediment

Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Methane: Vertical profile of methane in sediments

| STATION | MONTH   | DEPTH<br>(cm) | SIDE A*<br>(mM/Lws)** | SIDE B*<br>(mM/Lws)** | AVG<br>METHANE<br>(mM/Lws)** | STANDARD<br>DEVIATION | METHANE<br>(mM/m2) | AVERAGE<br>POROSITY | STANDARD<br>DEVIATION |
|---------|---------|---------------|-----------------------|-----------------------|------------------------------|-----------------------|--------------------|---------------------|-----------------------|
| HGK     | OCTOBER | 1             | 1.649                 | 1.535                 | 1.592                        | 0.057                 | 31.83              | 16.415              | 15.415                |
|         |         | 3             | 2.971                 | 1.626                 | 2.299                        | 0.673                 | 45.98              | 24.490              | 21.490                |
|         |         | 5             | 2.410                 | 2.717                 | 2.563                        | 0.153                 | 51.27              | 28.135              | 23.135                |
|         |         | 7             | 2.115                 | 1.606                 | 1.860                        | 0.255                 | 37.20              | 22.100              | 15.100                |
|         |         | 9             | 2.430                 | 1.144                 | 1.787                        | 0.643                 | 35.74              | 22.370              | 13.370                |
| GNCV    | OCTOBER | 1             | 1.585                 | 0.694                 | 1.140                        | 0.445                 | 22.79              | 11.895              | 10.895                |
|         |         | 3             | 1.323                 | 1.502                 | 1.413                        | 0.090                 | 28.26              | 15.630              | 12.630                |
|         |         | 5             | 1.307                 | 1.276                 | 1.291                        | 0.016                 | 25.83              | 15.415              | 10.415                |
|         |         | 7             | 1.898                 | 1.933                 | 1.915                        | 0.018                 | 38.30              | 22.650              | 15.650                |
|         |         | 9             | 3.239                 | 2.792                 | 3.016                        | 0.223                 | 60.31              | 34.655              | 25.655                |
| MDPT    | OCTOBER | 1             | 0.027                 | 0.032                 | 0.030                        | 0.002                 | 0.59               | 0.795               | 0.205                 |
|         |         | 3             | 0.379                 | 0.011                 | 0.195                        | 0.184                 | 3.90               | 3.450               | 0.450                 |
|         |         | 5             | 0.054                 | 0.285                 | 0.169                        | 0.116                 | 3.39               | 4.195               | 0.805                 |
|         |         | 7             | 0.020                 | 0.048                 | 0.034                        | 0.014                 | 0.68               | 3.840               | 3.160                 |
|         |         | 9             | 0.090                 | 0.131                 | 0.111                        | 0.020                 | 2.21               | 5.605               | 3.395                 |
| R 64    | OCTOBER | 1             | 0.020                 | 0.025                 | 0.022                        | 0.002                 | 0.45               | 0.725               | 0.275                 |
|         |         | 3             | 0.033                 | 0.031                 | 0.032                        | 0.001                 | 0.64               | 1.820               | 1.180                 |
|         |         | 5             | 0.038                 | 0.036                 | 0.037                        | 0.001                 | 0.74               | 2.870               | 2.130                 |
|         |         | 7             | 0.038                 | 0.036                 | 0.037                        | 0.001                 | 0.74               | 3.870               | 3.130                 |
|         |         | 9             | 0.036                 | 0.035                 | 0.036                        | 0.001                 | 0.71               | 4.855               | 4.145                 |

\*Note: A core was divided into two halves. Samples were taken from each half, side A and B respectively.

\*\*Note: Lws = liter wet sediment

# **Appendix D**

## **Incubation Core Nutrient Concentration Data Tables**

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Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Core Data: Dissolved nutrient and oxygen concentrations in sediment - water flux chambers

| STATION | DATE    | CORE |                               | TIME<br>DELTA<br>(min) | TIME<br>SUM<br>(min) | DO<br>(mg/L) | AA<br>VIAL<br>NO | NH4<br>(μM) | NO2+NO3<br>(μM) | DIP<br>(μM) |
|---------|---------|------|-------------------------------|------------------------|----------------------|--------------|------------------|-------------|-----------------|-------------|
|         |         | NO   | TIME OF<br>SAMPLE<br>(hr min) |                        |                      |              |                  |             |                 |             |
| HGNK    | 19MAY94 | B    | 10 25                         | 0                      | 0                    | 9.33         | 169              | 13.4        | 101.0           | 0.21        |
|         |         |      | 11 25                         | 60                     | 60                   | 9.30         | 174              | 13.0        | 101.5           | 0.27        |
|         |         |      | 12 25                         | 60                     | 120                  | 9.28         | 178              | 11.7        | 101.6           | 0.23        |
|         |         |      | 13 27                         | 62                     | 182                  | 9.26         | 182              | 12.4        | 101.8           | 0.22        |
|         |         | 1    | 14 25                         | 58                     | 240                  | 9.23         | 186              | 12.2        | 101.5           | 0.22        |
|         |         |      | 10 25                         | 0                      | 0                    | 8.94         | 170              | 17.6        | 100.1           | 0.26        |
|         |         |      | 11 25                         | 60                     | 60                   | 8.47         | 175              | 21.7        | 99.1            | 0.29        |
|         |         |      | 12 25                         | 60                     | 120                  | 8.07         | 179              | 25.0        | 97.3            | 0.29        |
|         |         |      | 13 27                         | 62                     | 182                  | 7.62         | 183              | 29.8        | 96.2            | 0.29        |
|         |         |      | 14 25                         | 58                     | 240                  | 7.20         | 187              | 36.7        | 94.7            | 0.29        |
|         |         | 2    | 10 25                         | 0                      | 0                    | 8.95         | 171              | 13.3        | 99.9            | 0.27        |
|         |         |      | 11 25                         | 60                     | 60                   | 8.44         | 176              | 16.0        | 99.0            | 0.30        |
|         |         |      | 12 25                         | 60                     | 120                  | 7.95         | 180              | 19.0        | 97.0            | 0.33        |
|         |         |      | 13 27                         | 62                     | 182                  | 7.43         | 184              | 22.4        | 94.8            | 0.33        |
|         |         |      | 14 25                         | 58                     | 240                  | 7.00         | 188              | 23.5        | 93.8            | 0.35        |
|         |         | 3    | 10 25                         | 0                      | 0                    | 8.87         | 172              | 13.6        | 99.3            | 0.26        |
|         |         |      | 11 25                         | 60                     | 60                   | 8.42         | 177              | 14.5        | 95.3            | 0.32        |
|         |         |      | 12 25                         | 60                     | 120                  | 7.98         | 181              | 16.9        | 93.5            | 0.30        |
|         |         |      | 13 27                         | 62                     | 182                  | 7.56         | 185              | 18.4        | 90.0            | 0.31        |
|         |         |      | 14 25                         | 58                     | 240                  | 7.26         | 189              | 20.3        | 85.9            | 0.31        |

HGNK May 1994 continued

| Si(OH) <sub>4</sub><br>( $\mu$ M) | DOC<br>(mg/L) | TCO <sub>2</sub><br>( $\mu$ M) | DON<br>( $\mu$ g/L) | TDN<br>( $\mu$ g/L) | DOP<br>( $\mu$ g/L) | TDP<br>( $\mu$ g/L) | pH   | Fe<br>( $\mu$ M) | Mn<br>( $\mu$ M) |
|-----------------------------------|---------------|--------------------------------|---------------------|---------------------|---------------------|---------------------|------|------------------|------------------|
| 94.3                              | 2.56          | 1388.7                         | 11.6                | 126.0               | 0.28                | 0.49                | 7.84 | 0.72             | 1.16             |
| 97.3                              | 2.36          | HH                             | 12.5                | 127.0               | 0.24                | 0.51                | 7.98 | 0.18             | 1.09             |
| 94.6                              | 2.44          | HH                             | 11.7                | 125.0               | 0.32                | 0.55                | 8.11 | 0.54             | 1.02             |
| 100.5                             | 2.43          | HH                             | 11.8                | 126.0               | 0.31                | 0.53                | 8.13 | 0.18             | 0.96             |
| 99.0                              | 2.40          | 1381.8                         | 14.3                | 128.0               | 0.30                | 0.52                | 7.99 | 0.00             | 0.91             |
| 93.5                              | 2.51          | 1504.4                         | 12.3                | 130.0               | 0.24                | 0.50                | 7.90 | 0.90             | 2.42             |
| 94.1                              | 2.54          | 1559.3                         | 20.2                | 141.0               | 0.24                | 0.53                | 7.88 | 0.72             | 3.57             |
| 99.8                              | 2.58          | HH                             | 23.7                | 146.0               | 0.27                | 0.56                | 7.85 | 6.98             | 4.31             |
| 105.4                             | 2.58          | 1690.6                         | 21.0                | 147.0               | 0.30                | 0.59                | 7.76 | 1.43             | 5.22             |
| 109.1                             | S             | 1703.5                         | 20.6                | 152.0               | 0.25                | 0.54                | 7.72 | 2.15             | 6.26             |
| 91.2                              | 2.49          | 1432.3                         | 12.8                | 126.0               | 0.25                | 0.52                | 7.96 | 0.18             | 1.89             |
| 96.5                              | 2.89          | 1603.4                         | 12.0                | 127.0               | 0.25                | 0.55                | 7.96 | 0.36             | 2.35             |
| 99.9                              | 2.53          | HH                             | 12.0                | 128.0               | 0.26                | 0.59                | 7.94 | 0.72             | 2.91             |
| 103.2                             | 2.54          | 1640.8                         | 11.8                | 129.0               | 0.32                | 0.65                | 7.89 | 0.54             | 3.60             |
| 111.1                             | S             | 1620.9                         | 15.7                | 133.0               | 0.24                | 0.59                | 7.79 | 0.18             | 4.10             |
| 98.9                              | 2.51          | 1423.2                         | 12.5                | 126.0               | 0.23                | 0.49                | 7.97 | 0.36             | 1.93             |
| 111.4                             | 2.51          | 1522.7                         | 13.2                | 123.0               | 0.25                | 0.57                | 7.98 | 0.36             | 2.57             |
| 119.6                             | 2.48          | HH                             | 12.6                | 123.0               | 0.27                | 0.57                | 7.94 | 0.90             | 3.09             |
| 133.9                             | 2.50          | 1599.8                         | 11.6                | 120.0               | 0.25                | 0.56                | 7.97 | 3.94             | 3.55             |
| 147.8                             | 2.52          | 1729.0                         | 11.8                | 118.0               | 0.22                | 0.53                | 7.89 | 0.00             | 4.04             |

Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Core Data: Dissolved nutrient and oxygen concentrations in sediment - water flux chambers

| STATION | DATE    | CORE NO | TIME OF SAMPLE (hr min) | TIME DELTA (min) | TIME SUM (min) | DO (mg/L) | AA VIAL NO | NH4 (μM) | NO2+NO3 (μM) | DIP (μM) |
|---------|---------|---------|-------------------------|------------------|----------------|-----------|------------|----------|--------------|----------|
| GNCV    | 19MAY94 | B       | 15 35                   | 0                | 0              | 9.09      | 191        | 4.2      | 91.2         | 0.23     |
|         |         |         | 16 35                   | 60               | 60             | 9.03      | 195        | 4.0      | 91.2         | 0.26     |
|         |         |         | 17 35                   | 60               | 120            | 8.99      | 199        | 4.2      | 91.2         | 0.27     |
|         |         |         | 18 35                   | 60               | 180            | 8.96      | 203        | 4.1      | 90.9         | 0.25     |
|         |         |         | 19 35                   | 60               | 240            | 8.93      | 207        | 4.0      | 91.0         | 0.24     |
|         |         | 1       | 15 35                   | 0                | 0              | 8.67      | 192        | 7.6      | 90.5         | 0.27     |
|         |         |         | 16 35                   | 60               | 60             | 8.08      | 196        | 10.3     | 88.8         | 0.31     |
|         |         |         | 17 35                   | 60               | 120            | 7.60      | 200        | 11.9     | 87.5         | 0.34     |
|         |         |         | 18 35                   | 60               | 180            | 7.17      | 204        | 12.8     | 86.6         | 0.32     |
|         |         |         | 19 35                   | 60               | 240            | 6.79      | 208        | 14.5     | 85.8         | 0.34     |
|         |         | 2       | 15 35                   | 0                | 0              | 8.71      | 193        | 6.6      | 90.0         | 0.26     |
|         |         |         | 16 35                   | 60               | 60             | 8.10      | 197        | 8.7      | 88.5         | 0.25     |
|         |         |         | 17 35                   | 60               | 120            | 7.59      | 201        | 10.6     | 87.4         | 0.32     |
|         |         |         | 18 35                   | 60               | 180            | 7.12      | 205        | 13.7     | 86.3         | 0.35     |
|         |         |         | 19 35                   | 60               | 240            | 6.72      | 209        | 15.3     | 85.8         | 0.34     |
|         |         | 3       | 15 35                   | 0                | 0              | 8.76      | 194        | 5.0      | 90.3         | 0.24     |
|         |         |         | 16 35                   | 60               | 60             | 8.23      | 198        | 6.7      | 89.4         | 0.26     |
|         |         |         | 17 35                   | 60               | 120            | 7.92      | 202        | 8.6      | 88.3         | 0.30     |
|         |         |         | 18 35                   | 60               | 180            | 7.53      | 206        | 9.8      | 87.3         | 0.29     |
|         |         |         | 19 35                   | 60               | 240            | 7.21      | 210        | 10.8     | 86.6         | 0.30     |

GNCV MAY 1994 continued

| Si(OH) <sub>4</sub><br>(μM) | DOC<br>(mg/L) | TCO <sub>2</sub><br>(μM) | DON<br>(μg/L) | TDN<br>(μg/L) | DOP<br>(μg/L) | TDP<br>(μg/L) | pH   | Fe<br>(μM) | Mn<br>(μM) |
|-----------------------------|---------------|--------------------------|---------------|---------------|---------------|---------------|------|------------|------------|
| 102.4                       | S             | 1229.0                   | 11.6          | 107           | 0.44          | 0.67          | 7.97 | -0.36      | 0.49       |
| 103.1                       | 2.66          | HH                       | 13.8          | 109           | 0.37          | 0.63          | 8.01 | -0.18      | 0.47       |
| 99.9                        | 2.61          | HH                       | 9.6           | 105           | 0.34          | 0.61          | 8.09 | 0.54       | 0.46       |
| 106.4                       | 2.64          | HH                       | 13.0          | 108           | 0.40          | 0.65          | 8.10 | -0.18      | 0.42       |
| 104.7                       | 2.75          | 1238.0                   | 12.0          | 107           | 0.35          | 0.59          | 8.04 | -0.36      | 0.42       |
| 102.1                       | 2.71          | 1330.8                   | 10.9          | 109           | 0.38          | 0.65          | 7.94 | -0.18      | 1.98       |
| 105.3                       | 2.80          | 1417.0                   | 11.9          | 111           | 0.33          | 0.64          | 7.86 | 0          | 2.73       |
| 107.1                       | 2.78          | HH                       | 12.6          | 112           | 0.37          | 0.71          | 7.86 | -0.18      | 2.89       |
| 108.9                       | 2.75          | 1502.8                   | 12.6          | 112           | 0.36          | 0.68          | 7.84 | 0          | 2.99       |
| 110.3                       | S             | 1543.6                   | 11.7          | 112           | 0.34          | 0.68          | 7.80 | -0.18      | 2.86       |
| 102.8                       | 2.74          | 1295.0                   | 11.4          | 108           | 0.37          | 0.63          | 8.01 | -0.18      | 1.57       |
| 105.3                       | 2.76          | 1368.0                   | 11.8          | 109           | 0.40          | 0.65          | 7.91 | -0.18      | 2.33       |
| 103.0                       | 2.74          | HH                       | 12.0          | 110           | 0.37          | 0.69          | 7.88 | -0.18      | 2.80       |
| 106.4                       | S             | 1473.3                   | S             | S             | S             | S             | 7.85 | -0.18      | 3.22       |
| 103.5                       | 2.94          | 1492.9                   | 9.9           | 111           | 0.34          | 0.68          | 7.82 | -0.18      | 3.48       |
| 102.6                       | 2.62          | 1285.9                   | 13.7          | 109           | 0.40          | 0.64          | 8.05 | 1.25       | 0.96       |
| 102.4                       | 2.83          | 1350.6                   | 11.9          | 108           | 0.39          | 0.65          | 7.95 | 2.33       | 1.31       |
| 102.7                       | 2.87          | HH                       | 12.1          | 109           | 0.34          | 0.64          | 7.94 | 0.18       | 1.57       |
| 105.0                       | 2.73          | 1359.0                   | 13.9          | 111           | 0.38          | 0.67          | 7.96 | -0.36      | 1.75       |
| 105.2                       | 2.90          | 1378.2                   | 11.6          | 109           | 0.33          | 0.63          | 7.85 | -0.36      | 1.86       |

Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Core Data: Dissolved nutrient and oxygen concentrations in sediment - water flux chambers

| STATION | DATE    | CORE NO | TIME OF SAMPLE (hr min) | TIME DELTA (min) | TIME SUM (min) | DO (mg/L) | AA VIAL NO | NH4 (μM) | NO2+NO3 (μM) | DIP (μM) |
|---------|---------|---------|-------------------------|------------------|----------------|-----------|------------|----------|--------------|----------|
| MDPT    | 20MAY94 | B       | 10 35                   | 0                | 0              | 8.03      | 214        | 5.1      | 92.7         | 0.85     |
|         |         |         | 11 35                   | 60               | 60             | 7.97      | 218        | 5.0      | 92.6         | 0.85     |
|         |         |         | 12 35                   | 60               | 120            | 7.97      | 222        | 4.9      | 92.8         | 0.86     |
|         |         |         | 13 45                   | 70               | 190            | 7.98      | 226        | 5.0      | 92.8         | 0.84     |
|         |         |         | 14 47                   | 62               | 252            | 7.95      | 230        | 5.3      | 93.3         | 0.84     |
|         |         |         |                         |                  |                |           |            |          |              |          |
|         |         | 1       | 10 35                   | 0                | 0              | 7.88      | 215        | 5.5      | 92.1         | 0.91     |
|         |         |         | 11 35                   | 60               | 60             | 7.50      | 219        | 6.0      | 91.4         | 0.95     |
|         |         |         | 12 35                   | 60               | 120            | 7.21      | 223        | 6.4      | 90.3         | 0.95     |
|         |         |         | 13 45                   | 70               | 190            | 6.83      | 227        | 7.1      | 89.4         | 0.98     |
|         |         |         | 14 47                   | 62               | 252            | 6.62      | 231        | 6.9      | 88.2         | 0.94     |
|         |         |         |                         |                  |                |           |            |          |              |          |
|         |         | 2       | 10 35                   | 0                | 0              | 7.72      | 216        | 6.0      | 91.6         | 0.94     |
|         |         |         | 11 35                   | 60               | 60             | 7.11      | 220        | 6.9      | 89.6         | 0.95     |
|         |         |         | 12 35                   | 60               | 120            | 6.58      | 224        | 7.5      | 87.7         | 0.96     |
|         |         |         | 13 45                   | 70               | 190            | 5.95      | 228        | 8.3      | 84.5         | 1.01     |
|         |         |         | 14 47                   | 62               | 252            | 5.57      | 232        | 9.5      | 84.1         | 1.05     |
|         |         |         |                         |                  |                |           |            |          |              |          |
|         |         | 3       | 10 35                   | 0                | 0              | 7.74      | 217        | 5.7      | 92.0         | 0.90     |
|         |         |         | 11 35                   | 60               | 60             | 7.21      | 221        | 6.4      | 89.3         | 0.88     |
|         |         |         | 12 35                   | 60               | 120            | 6.76      | 225        | 7.1      | 87.8         | 0.96     |
|         |         |         | 13 45                   | 70               | 190            | 6.26      | 229        | 7.9      | 84.8         | 0.97     |
|         |         |         | 14 47                   | 62               | 252            | 5.93      | 233        | 8.3      | 83.5         | 1.01     |
|         |         |         |                         |                  |                |           |            |          |              |          |

## MDPT MAY 1994 continued

| Si(OH) <sub>4</sub><br>( $\mu$ M) | DOC<br>(mg/L) | TCO <sub>2</sub><br>( $\mu$ M) | DON<br>( $\mu$ g/L) | TDN<br>( $\mu$ g/L) | DOP<br>( $\mu$ g/L) | TDP<br>( $\mu$ g/L) | pH   | Fe<br>( $\mu$ M) | Mn<br>( $\mu$ M) |
|-----------------------------------|---------------|--------------------------------|---------------------|---------------------|---------------------|---------------------|------|------------------|------------------|
| 29.7                              | 2.77          | 1517.1                         | 10.2                | 108                 | 0.37                | 1.22                | 7.94 | 0.54             | 0.47             |
| 28.6                              | 2.66          | HH                             | 5.4                 | 103                 | 0.18                | 1.03                | 7.82 | -0.18            | 0.46             |
| 27.6                              | 2.62          | HH                             | S                   | S                   | S                   | S                   | 7.86 | 0.54             | 0.47             |
| 27.8                              | 2.75          | HH                             | 9.2                 | 107                 | 0.29                | 1.13                | 7.81 | -0.18            | 0.46             |
| 28.1                              | 2.76          | 1519.6                         | 10.4                | 109                 | 0.40                | 1.24                | 7.81 | -0.18            | 0.46             |
| 30.1                              | 2.95          | 1523.5                         | 6.4                 | 104                 | 0.17                | 1.08                | 7.95 | 0.18             | 0.95             |
| 34.2                              | 2.68          | 1533.8                         | 7.6                 | 105                 | 0.20                | 1.15                | 7.87 | 0.18             | 1.26             |
| 36.8                              | 2.73          | HH                             | 8.3                 | 105                 | 0.21                | 1.16                | 7.86 | 0.54             | 1.55             |
| 38.2                              | 2.69          | 1550.8                         | 7.5                 | 104                 | 0.20                | 1.18                | 7.79 | 0.90             | 1.78             |
| 45.2                              | 2.88          | 1569.9                         | 10.9                | 106                 | 0.34                | 1.28                | 7.83 | 0.18             | 1.84             |
| 29.2                              | 2.74          | 1523.6                         | 9.4                 | 107                 | 0.28                | 1.22                | 7.95 | -0.36            | 0.93             |
| 31.8                              | 2.69          | 1534.8                         | 7.5                 | 104                 | 0.27                | 1.22                | 7.84 | 0.36             | 1.27             |
| 32.6                              | 3.01          | HH                             | 8.8                 | 104                 | 0.22                | 1.18                | 7.81 | -0.18            | 1.55             |
| 32.7                              | 2.73          | 1551.1                         | 8.2                 | 101                 | 0.17                | 1.18                | 7.72 | 0.18             | 1.98             |
| 34.3                              | 2.78          | 1561.1                         | 6.4                 | 100                 | 0.20                | 1.25                | 7.75 | 0.00             | 2.11             |
| 30.2                              | 2.74          | 1508.3                         | 7.3                 | 105                 | 0.22                | 1.12                | 7.94 | 0.18             | 0.82             |
| 31.2                              | 2.67          | 1531.4                         | 8.3                 | 104                 | 0.31                | 1.19                | 7.88 | 0.00             | 1.16             |
| 32.4                              | 2.75          | HH                             | 9.1                 | 104                 | 0.27                | 1.23                | 7.86 | 0.18             | 1.44             |
| 35.0                              | 2.93          | 1548.0                         | 9.3                 | 102                 | 0.28                | 1.25                | 7.79 | 0.18             | 1.78             |
| 37.1                              | 2.81          | 1560.8                         | 8.2                 | 100                 | 0.32                | 1.33                | 7.78 | 0.00             | 1.97             |

# Numerical Water Quality and Contaminant Modeling (EL-22)

Tidal Fresh Potomac River and Maryland Mainstem

Core Data: Dissolved nutrient and oxygen concentrations in sediment - water flux chambers

| STATION | DATE    | CORE NO | TIME OF SAMPLE<br>(hr min) | TIME DELTA<br>(min) | TIME SUM<br>(min) | DO<br>(mg/L) | AA VIAL NO | NH4<br>( $\mu$ M) | NO2+NO3<br>( $\mu$ M) | DIP<br>( $\mu$ M) |
|---------|---------|---------|----------------------------|---------------------|-------------------|--------------|------------|-------------------|-----------------------|-------------------|
| R-64    | 21MAY94 | B       | 11 10                      | 0                   | 0                 | 4.31         | 128        | 11.6              | 25.6                  | 0.12              |
|         |         |         | 12 10                      | 60                  | 60                | 4.27         | 132        | 11.4              | 25.7                  | 0.12              |
|         |         |         | 13 10                      | 60                  | 120               | 4.27         | 136        | 11.6              | 25.7                  | 0.13              |
|         |         |         | 14 10                      | 60                  | 180               | 4.27         | 141        | 11.9              | 25.7                  | 0.13              |
|         |         |         | 15 10                      | 60                  | 240               | 4.22         | 149        | 11.6              | 25.7                  | 0.12              |
|         |         | 1       | 11 10                      | 0                   | 0                 | 4.07         | 129        | 13.1              | 25.2                  | 0.22              |
|         |         |         | 12 10                      | 60                  | 60                | 3.79         | 133        | 15.2              | 24.5                  | 0.26              |
|         |         |         | 13 10                      | 60                  | 120               | 3.56         | 137        | 17.4              | 24.1                  | 0.29              |
|         |         |         | 14 10                      | 60                  | 180               | 3.36         | 142        | 18.7              | 23.0                  | 0.32              |
|         |         |         | 15 10                      | 60                  | 240               | 3.18         | 150        | 20.2              | 23.0                  | 0.32              |
|         |         | 2       | 11 10                      | 0                   | 0                 | 4.15         | 130        | 13.0              | 25.2                  | 0.23              |
|         |         |         | 12 10                      | 60                  | 60                | 3.83         | 134        | 14.4              | 24.4                  | 0.25              |
|         |         |         | 13 10                      | 60                  | 120               | 3.57         | 138        | 15.9              | 23.6                  | 0.28              |
|         |         |         | 14 10                      | 60                  | 180               | 3.34         | 143        | 17.1              | 23.4                  | 0.33              |
|         |         |         | 15 10                      | 60                  | 240               | 3.16         | 151        | 18.3              | 22.4                  | 0.31              |
|         |         | 3       | 11 10                      | 0                   | 0                 | 4.18         | 131        | 12.2              | 25.3                  | 0.21              |
|         |         |         | 12 10                      | 60                  | 60                | 3.89         | 135        | 13.6              | 24.7                  | 0.28              |
|         |         |         | 13 10                      | 60                  | 120               | 3.62         | 139        | 14.8              | 23.7                  | 0.31              |
|         |         |         | 14 10                      | 60                  | 180               | 3.45         | 144        | 15.8              | 22.9                  | 0.32              |
|         |         |         | 15 10                      | 60                  | 240               | SS           | 152        | 16.9              | 22.6                  | 0.33              |

R 64 MAY 1994 continued

| Si(OH) <sub>4</sub><br>(μM) | DOC<br>(mg/L) | TCO <sub>2</sub><br>(μM) | DON<br>(μg/L) | TDN<br>(μg/L) | DOP<br>(μg/L) | TDP<br>(μg/L) | pH   | Fe<br>(μM) | Mn<br>(μM) |
|-----------------------------|---------------|--------------------------|---------------|---------------|---------------|---------------|------|------------|------------|
| 14.6                        | 2.15          | 1498.0                   | 15.1          | 52.3          | 0.10          | 0.22          | 7.30 | 1.79       | 1.38       |
| 14.7                        | 2.19          | 1497.2                   | 17.3          | 54.4          | 0.23          | 0.35          | 7.42 | 1.61       | 1.47       |
| 15.0                        | 2.11          | 1497.3                   | 15.1          | 52.4          | 0.15          | 0.28          | 7.35 | 1.61       | 1.46       |
| 14.7                        | 2.09          | 1497.2                   | 16.1          | 53.7          | 0.18          | 0.31          | 7.29 | 1.61       | 1.42       |
| 14.6                        | 2.14          | 1494.2                   | 15.5          | 52.8          | 0.20          | 0.32          | 7.30 | 2.15       | 1.49       |
| 16.8                        | 2.18          | 1513.0                   | 17.2          | 55.5          | 0.12          | 0.34          | 7.34 | 1.79       | 1.71       |
| 19.4                        | 2.16          | 1531.7                   | 19.5          | 59.2          | 0.23          | 0.49          | 7.38 | 1.97       | 1.86       |
| 21.6                        | 2.14          | 1553.0                   | 17.7          | 59.2          | 0.20          | 0.49          | 7.31 | 1.97       | 2.06       |
| 23.7                        | 2.17          | 1565.1                   | 17.1          | 58.8          | 0.21          | 0.53          | 7.26 | 1.79       | 2.13       |
| 25.2                        | 2.15          | 1578.3                   | 19.9          | 63.1          | 0.26          | 0.58          | 7.24 | 1.97       | 2.17       |
| 16.9                        | 2.23          | 1505.0                   | 18.6          | 56.8          | 0.26          | 0.49          | 7.31 | 2.15       | 1.64       |
| 19.0                        | 2.17          | 1521.6                   | 17.1          | 55.9          | 0.18          | 0.43          | 7.40 | 1.97       | 1.67       |
| 21.0                        | 2.16          | 1533.3                   | 16.8          | 56.3          | 0.17          | 0.45          | 7.34 | 1.97       | 1.78       |
| 23.2                        | 2.15          | 1540.3                   | 16.4          | 56.9          | 0.17          | 0.50          | 7.32 | 2.86       | 1.97       |
| 24.8                        | 2.18          | 1554.5                   | 17.4          | 58.1          | 0.19          | 0.50          | 7.30 | 1.97       |            |
| 15.8                        | 2.13          | 1505.6                   | 17.1          | 54.6          | 0.15          | 0.36          | 7.39 | 1.97       | 1.64       |
| 18.4                        | 2.29          | 1526.1                   | 17.7          | 56.0          | 0.19          | 0.47          | 7.38 | 1.97       | 1.66       |
| 20.2                        | 2.14          | 1533.2                   | 17.1          | 55.6          | 0.17          | 0.48          | 7.35 | 2.15       | 1.66       |
| 22.6                        | 2.16          | 1548.0                   | 17.8          | 56.5          | 0.18          | 0.50          | 7.33 | 2.33       | 1.80       |
| 24.9                        | 2.12          | 1556.9                   | 23.0          | 62.5          | 0.26          | 0.59          | 7.28 | 3.22       | 1.86       |

# Numerical Water Quality and Contaminant Modeling (EL-22)

Tidal Fresh Potomac River and Maryland Mainstem

Core Data: Dissolved nutrient and oxygen concentrations in sediment - water flux chambers

| STATION | DATE    | CORE NO | TIME OF SAMPLE (hr min) | TIME DELTA (min) | TIME SUM (min) | DO (mg/L) | AA VIAL NO | NH4 (μM) | NO2+NO3 (μM) | DIP (μM) |
|---------|---------|---------|-------------------------|------------------|----------------|-----------|------------|----------|--------------|----------|
| HGK     | 12JUL94 | B       | 11 15                   | 0                | 0              | 7.10      | 170        | 4.6      | 90.50        | 0.41     |
|         |         |         | 12 20                   | 65               | 65             | 7.02      | 174        | 4.7      | 89.80        | 0.53     |
|         |         |         | 13 20                   | 60               | 125            | 6.95      | 178        | 4.6      | 89.20        | 0.60     |
|         |         |         | 14 20                   | 60               | 185            | 6.88      | 183        | 4.8      | 89.10        | 0.36     |
|         |         |         | 15 45                   | 85               | 270            | 6.75      | 187        | 4.7      | 87.90        | 0.47     |
|         |         | 1       | 11 15                   | 0                | 0              | 6.65      | 171        | 10.0     | 89.00        | 0.62     |
|         |         |         | 12 20                   | 65               | 65             | 5.74      | 175        | 17.0     | 86.20        | 0.51     |
|         |         |         | 13 20                   | 60               | 125            | 4.99      | 179        | 21.8     | 83.30        | 0.62     |
|         |         |         | 14 20                   | 60               | 185            | 4.30      | 184        | 27.0     | 80.40        | 0.64     |
|         |         |         | 15 45                   | 85               | 270            | 3.40      | 188        | 34.7     | 76.30        | 1.28     |
|         |         | 2       | 11 15                   | 0                | 0              | 6.79      | 172        | 15.8     | 89.30        | 0.38     |
|         |         |         | 12 20                   | 65               | 65             | 5.83      | 176        | 29.6     | 87.00        | 0.45     |
|         |         |         | 13 20                   | 60               | 125            | 5.01      | 180        | 41.0     | 85.10        | 0.46     |
|         |         |         | 14 20                   | 60               | 185            | 4.32      | 185        | 45.9     | 83.00        | 0.50     |
|         |         |         | 15 45                   | 85               | 270            | 3.45      | 189        | 56.8     | 79.70        | 0.73     |
|         |         | 3       | 11 15                   | 0                | 0              | 6.87      | 173        | 8.2      | 88.60        | 0.62     |
|         |         |         | 12 20                   | 65               | 65             | 5.92      | 177        | 13.9     | 86.30        | 0.47     |
|         |         |         | 13 20                   | 60               | 125            | 5.10      | 181        | 18.9     | 84.40        | 0.66     |
|         |         |         | 14 20                   | 60               | 185            | 4.36      | 186        | 23.1     | 82.30        | 0.45     |
|         |         |         | 15 45                   | 85               | 270            | 3.41      | 190        | 27.9     | 79.30        | 0.80     |

HGNK JULY 1994 continued

| Si(OH) <sub>4</sub><br>(μM) | DOC<br>(mg/L) | TCO <sub>2</sub><br>(μM) | DON<br>(μg/L) | TDN<br>(μg/L) | DOP<br>(μg/L) | TDP<br>(μg/L) | pH   | Fe<br>(μM) | Mn<br>(μM) |
|-----------------------------|---------------|--------------------------|---------------|---------------|---------------|---------------|------|------------|------------|
| 5.6                         | 3.86          | 1679.3                   | 24.9          | 120.0         | 0.60          | 1.01          | 7.82 | 0.90       | 0.47       |
| 8.4                         | 4.02          | HH                       | 27.5          | 122.0         | 0.54          | 1.07          | 7.76 | 0.36       | 0.27       |
| 12.4                        | 3.88          | HH                       | 19.6          | 113.4         | 0.47          | 1.07          | 7.63 | 0.36       | 0.25       |
| 16.2                        | 3.91          | HH                       | 23.1          | 117.0         | 0.73          | 1.09          | 7.77 | 0.18       | 0.27       |
| 22.0                        | 3.86          | 1762.3                   | 30.4          | 123.0         | 0.61          | 1.08          | 7.63 | 0.18       | 0.25       |
| 4.3                         | 3.92          | 1771.6                   | 28.0          | 127.0         | 0.59          | 1.21          | 7.73 | 0.00       | 1.16       |
| 7.6                         | 4.04          | 1816.8                   | 26.8          | 130.0         | 0.80          | 1.31          | 7.62 | 0.18       | 2.06       |
| 10.8                        | 4.19          | HH                       | 25.9          | 131.0         | 0.91          | 1.53          | 7.50 | 0.00       | 2.77       |
| 13.5                        | 4.05          | 1956.4                   | 30.6          | 138.0         | 0.94          | 1.58          | 7.50 | 0.18       | 3.57       |
| 16.8                        | 4.06          | 2007.7                   | 22.0          | 133.0         | 0.35          | 1.63          | 7.41 | 3.76       | 5.02       |
| 5.2                         | 4.02          | 1822.9                   | 25.9          | 131.0         | 0.69          | 1.07          | 7.70 | -0.18      | 1.73       |
| 9.1                         | 4.04          | 1845.2                   | 25.4          | 142.0         | 0.64          | 1.09          | 7.53 | 0.36       | 3.29       |
| 12.8                        | 4.13          | HH                       | 23.9          | 150.0         | 0.74          | 1.20          | 7.42 | 0.36       | 4.57       |
| 15.7                        | 4.24          | 1970.1                   | 23.1          | 152.0         | 0.65          | 1.15          | 7.41 | 0.36       | 5.77       |
| 20.0                        | 4.29          | 2049.4                   | 30.5          | 167.0         | 0.64          | 1.37          | 7.34 | 0.36       | 7.81       |
| 3.8                         | 3.96          | 1779.3                   | 26.2          | 123.0         | 0.49          | 1.11          | 7.77 | 0.36       | 1.04       |
| 6.6                         | 4.09          | 1811.4                   | 27.8          | 128.0         | 0.63          | 1.10          | 7.65 | 0.18       | 1.67       |
| 8.8                         | 4.09          | HH                       | 25.7          | 129.0         | 0.50          | 1.16          | 7.53 | 0.18       | 2.22       |
| 11.3                        | 4.23          | 1904.9                   | 25.6          | 131.0         | 0.82          | 1.27          | 7.49 | 0.00       | 2.82       |
| 13.8                        | 4.16          | 1960.1                   | 25.8          | 133.0         | 0.53          | 1.33          | 7.43 | 0.54       | 3.64       |

Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Core Data: Dissolved nutrient and oxygen concentrations in sediment - water flux chambers

| STATION | DATE    | CORE NO | TIME OF SAMPLE (hr min) | TIME DELTA (min) | TIME SUM (min) | DO (mg/L) | AA VIAL NO | NH4 (μM) | NO2+NO3 (μM) | DIP (μM) |
|---------|---------|---------|-------------------------|------------------|----------------|-----------|------------|----------|--------------|----------|
| GNCV    | 12JUL94 | B       | 15 15                   | 0                | 0              | 8.70      | 191        | 0.4      | 48.5         | 0.79     |
|         |         |         | 16 15                   | 60               | 60             | 8.40      | 195        | 0.4      | 48.3         | 0.84     |
|         |         |         | 17 15                   | 60               | 120            | 8.28      | 199        | 0.5      | 48.3         | 0.81     |
|         |         |         | 18 15                   | 60               | 180            | 8.18      | 203        | 0.6      | 48.6         | 0.72     |
|         |         |         | 19 15                   | 60               | 240            | 8.09      | 207        | 0.9      | 48.7         | 0.87     |
|         |         | 1       | 15 15                   | 0                | 0              | 8.60      | 192        | 2.2      | 48.1         | 0.51     |
|         |         |         | 16 15                   | 60               | 60             | 7.81      | 196        | 4.0      | 47.9         | 0.85     |
|         |         |         | 17 15                   | 60               | 120            | 7.23      | 200        | 5.3      | 47.3         | 0.77     |
|         |         |         | 18 15                   | 60               | 180            | 6.75      | 204        | 7.0      | 47.3         | 0.79     |
|         |         |         | 19 15                   | 60               | 240            | 6.32      | 208        | 8.5      | 46.8         | 1.02     |
|         |         | 2       | 15 15                   | 0                | 0              | 8.44      | 193        | 3.4      | 48.7         | 0.61     |
|         |         |         | 16 15                   | 60               | 60             | 7.56      | 197        | 5.4      | 48.2         | 1.03     |
|         |         |         | 17 15                   | 60               | 120            | 6.85      | 201        | 7.7      | 47.7         | 0.99     |
|         |         |         | 18 15                   | 60               | 180            | 6.27      | 205        | 9.4      | 47.3         | 0.96     |
|         |         |         | 19 15                   | 60               | 240            | 5.77      | 209        | 10.7     | 47.0         | 1.06     |
|         |         | 3       | 15 15                   | 0                | 0              | 9.13      | 194        | 2.1      | 49.0         | 0.71     |
|         |         |         | 16 15                   | 60               | 60             | 8.12      | 198        | 4.1      | 48.3         | 0.96     |
|         |         |         | 17 15                   | 60               | 120            | 7.44      | 202        | 6.0      | 48.0         | 0.95     |
|         |         |         | 18 15                   | 60               | 180            | 6.85      | 206        | 7.3      | 47.9         | 0.85     |
|         |         |         | 19 15                   | 60               | 240            | 6.35      | 210        | 9.1      | 37.3         | 1.15     |

GNCV JULY 1994 continued

| Si(OH) <sub>4</sub><br>(μM) | DOC<br>(mg/L) | TCO <sub>2</sub><br>(μM) | UON<br>(μg/L) | TDN<br>(μg/L) | DOP<br>(μg/L) | TDP<br>(μg/L) | pH   | Fe<br>(μM) | Mn<br>(μM) |
|-----------------------------|---------------|--------------------------|---------------|---------------|---------------|---------------|------|------------|------------|
| 2.3                         | 4.03          | 1506.0                   | 25.5          | 74.4          | 0.58          | 1.37          | 8.47 | 0.00       | 0.35       |
| 0.8                         | 4.17          | 1511.8                   | 24.3          | 73.0          | 0.56          | 1.40          | 8.25 | 0.18       | 0.29       |
| 0.8                         | 4.17          | 1509.2                   | 25.3          | 74.1          | 0.58          | 1.39          | 8.41 | 0.00       | 0.31       |
| 1.3                         | 4.20          | 1513.0                   | 26.4          | 75.6          | 0.71          | 1.43          | 8.38 | 0.00       | 0.27       |
| 1.2                         | 4.18          | 1515.4                   | 25.4          | 75.0          | 0.53          | 1.40          | 8.39 | 0.00       | 0.31       |
| 1.2                         | 4.10          | 1549.4                   | 26.2          | 76.5          | 0.89          | 1.40          | 8.39 | 0.18       | 0.33       |
| 2.6                         | 4.32          | 1607.0                   | 25.3          | 77.2          | 0.66          | 1.51          | 8.30 | 0.18       | 0.31       |
| 3.4                         | 4.36          | 1660.1                   | 25.7          | 78.3          | 0.70          | 1.47          | 8.16 | 0.36       | 0.31       |
| 5.0                         | 4.37          | 1688.6                   | 25.3          | 79.6          | 0.72          | 1.51          | 8.20 | 0.72       | 0.46       |
| 5.2                         | 4.48          | 1718.4                   | 26.1          | 81.4          | 0.57          | 1.59          | 8.17 | 0.18       | 0.38       |
| 1.9                         | 4.15          | 1544.2                   | 25.3          | 77.4          | 0.84          | 1.45          | 8.38 | 0.00       | 0.95       |
| 2.6                         | 4.02          | 1589.8                   | 26.6          | 80.2          | 0.51          | 1.54          | 8.26 | -0.18      | 0.75       |
| 4.3                         | 4.24          | 1639.8                   | 26.8          | 82.2          | 0.61          | 1.60          | 8.13 | 0.00       | 0.62       |
| 5.3                         | 4.40          | 1674.6                   | 24.9          | 81.6          | 0.59          | 1.55          | 8.09 | 0.18       | 0.66       |
| 5.8                         | 4.31          | 1704.9                   | 24.5          | 82.2          | 0.46          | 1.52          | 8.03 | 0.00       | 0.55       |
| 1.1                         | 4.14          | 1553.1                   | 27.2          | 78.3          | 0.66          | 1.37          | 8.45 | -0.36      | 0.35       |
| 2.4                         | 4.23          | 1592.6                   | 26.1          | 78.5          | 0.54          | 1.50          | 8.35 | -0.18      | 0.36       |
| 3.6                         | S<br>1644.1   |                          | 25.6          | 79.6          | 0.63          | 1.58          | 8.20 | 0.18       | 0.38       |
| 3.5                         | 4.43          | 1675.1                   | 27.3          | 82.5          | 0.71          | 1.56          | 8.16 | -0.18      | 0.40       |
| 3.9                         | 5.13          | 1705.2                   | 36.0          | 82.4          | 0.47          | 1.62          | 8.10 | -0.18      | 0.44       |

Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Core Data: Dissolved nutrient and oxygen concentrations in sediment - water flux chambers

| STATION | DATE    | CORE NO | TIME OF SAMPLE (hr min) | TIME DELTA (min) | TIME SUM (min) | DO (mg/L) | AA VIAL NO | NH4 (μM) | NO2+NO3 (μM) | DIP (μM) |
|---------|---------|---------|-------------------------|------------------|----------------|-----------|------------|----------|--------------|----------|
| MDPT    | 13JUL94 | B       | 11 30                   | 0                | 0              | 4.85      | 214        | 5.1      | 26.1         | 1.71     |
|         |         |         | 12 30                   | 60               | 60             | 4.79      | 218        | 5.4      | 26.3         | 1.75     |
|         |         |         | 13 30                   | 60               | 120            | 4.79      | 222        | 6.5      | 26.4         | 1.79     |
|         |         |         | 14 30                   | 60               | 180            | 4.78      | 226        | 5.3      | 26.4         | 1.71     |
|         |         |         | 15 30                   | 60               | 240            | 4.77      | 230        | 5.4      | 27.1         | 1.80     |
|         |         | 1       | 11 30                   | 0                | 0              | 4.65      | 215        | 8.7      | 25.6         | 1.84     |
|         |         |         | 12 30                   | 60               | 60             | 3.96      | 219        | 13.2     | 24.7         | 1.76     |
|         |         |         | 13 30                   | 60               | 120            | 3.47      | 223        | 17.3     | 19.9         | 1.34     |
|         |         |         | 14 30                   | 60               | 180            | 3.05      | 227        | 19.3     | 22.5         | 1.65     |
|         |         |         | 15 30                   | 60               | 240            | 2.71      | 231        | 21.7     | 21.0         | 1.59     |
|         |         | 2       | 11 30                   | 0                | 0              | 4.76      | 216        | 5.6      | 26.3         | 1.73     |
|         |         |         | 12 30                   | 60               | 60             | 4.16      | 220        | 7.5      | 24.6         | 1.76     |
|         |         |         | 13 30                   | 60               | 120            | 3.79      | 224        | 7.9      | 24.0         | 1.63     |
|         |         |         | 14 30                   | 60               | 180            | 3.46      | 228        | 8.6      | 26.5         | 1.74     |
|         |         |         | 15 30                   | 60               | 240            | 3.22      | 400        | 8.8      | 20.5         | 1.52     |
|         |         | 3       | 11 30                   | 0                | 0              | 4.66      | 217        | 10.4     | 25.1         | 1.77     |
|         |         |         | 12 30                   | 60               | 60             | 3.78      | 221        | 18.3     | 23.6         | 1.77     |
|         |         |         | 13 30                   | 60               | 120            | 3.19      | 225        | 27.0     | 26.8         | 1.55     |
|         |         |         | 14 30                   | 60               | 180            | 2.67      | 229        | 31.1     | 13.7         | 1.50     |
|         |         |         | 15 30                   | 60               | 240            | 2.30      | 401        | 37.7     | 19.2         | 1.96     |

MDPT JULY 1994 continued

| Si(OH) <sub>4</sub><br>(μM) | DOC<br>(mg/L) | TCO <sub>2</sub><br>(μM) | DON<br>(μg/L) | TDN<br>(μg/L) | DOP<br>(μg/L) | TDP<br>(μg/L) | pH   | Fe<br>(μM) | Mn<br>(μM) |
|-----------------------------|---------------|--------------------------|---------------|---------------|---------------|---------------|------|------------|------------|
| 65.4                        | 2.98          | 1284.9                   | 20.0          | 51.2          | 0.23          | 1.94          | 7.42 | HH         | 0.00       |
| 66.6                        | 2.92          | HH                       | 17.7          | 49.4          | 0.19          | 1.94          | 7.35 | -0.18      | 0.49       |
| 67.0                        | 2.89          | HH                       | 17.7          | 50.6          | 0.15          | 1.94          | 7.34 | 0.00       | 0.47       |
| 58.3                        | 2.84          | HH                       | 17.5          | 49.2          | 0.21          | 1.92          | 7.34 | 0.00       | 0.40       |
| 64.6                        | 2.96          | 1281.1                   | 17.9          | 50.4          | 0.14          | 1.94          | 7.38 | -0.18      | 0.42       |
| 67.3                        | 2.87          | 1284.4                   | 18.2          | 52.5          | 0.20          | 2.04          | 7.40 | 0.36       | 2.51       |
| 68.4                        | 2.86          | 1303.4                   | 19.0          | 56.9          | 0.23          | 1.99          | 7.32 | 0.00       | 4.46       |
| 68.4                        | 2.84          | HH                       | 21.6          | 58.8          | 0.53          | 1.87          | 7.29 | 0.18       | 6.01       |
| 81.1                        | 2.82          | 1325.2                   | 20.3          | 62.1          | 0.18          | 1.83          | 7.26 | 0.36       | 7.34       |
| 74.5                        | 2.88          | 1332.0                   | 18.8          | 61.5          | 0.28          | 1.87          | 7.27 | 0.54       | 8.30       |
| 64.7                        | 2.95          | 1285.8                   | 20.1          | 52.0          | 0.17          | 1.90          | 7.40 | -0.18      | 1.64       |
| 68.8                        | 2.93          | 1305.9                   | 18.4          | 50.5          | 0.09          | 1.85          | 7.34 | 7.52       | 3.84       |
| 68.7                        | 2.82          | HH                       | 17.9          | 49.8          | 0.15          | 1.78          | 7.32 | -0.36      | 3.51       |
| 72.5                        | 2.88          | 1344.5                   | 14.6          | 49.7          | 0.02          | 1.76          | 7.29 | -0.18      | 4.08       |
| 73.2                        | 2.94          | 1369.4                   | 20.9          | 50.2          | 0.23          | 1.75          | 7.30 | -0.18      | 4.77       |
| 65.7                        | 2.93          | 1290.1                   | 16.0          | 51.5          | 0.17          | 1.94          | 7.40 | 0.00       | 4.17       |
| 74.4                        | 2.97          | 1322.3                   | 17.6          | 59.5          | 0.20          | 1.97          | 7.31 | 0.18       | 7.86       |
| 80.0                        | 2.84          | HH                       | 9.4           | 63.2          | 0.39          | 1.94          | 7.26 | 0.54       | 10.65      |
| 89.4                        | 2.94          | 1353.4                   | 21.7          | 66.5          | 0.38          | 1.88          | 7.23 | 1.25       | 13.11      |
| 82.4                        | 2.88          | 1383.8                   | 16.9          | 73.8          | 0.26          | 2.22          | 7.23 | 2.15       | 14.71      |

Numerical Water Quality and Contaminant Modeling (EL-22)

Tidal Fresh Potomac River and Maryland Mainstem

Core Data: Dissolved nutrient and oxygen concentrations in sediment - water flux chambers

| STATION | DATE    | CORE NO | TIME OF SAMPLE (hr min) | TIME DELTA (min) | TIME SUM (min) | DO (mg/L) | AA VIAL NO | NH4 (μM) | NO2+NO3 (μM) | DIP (μM) |
|---------|---------|---------|-------------------------|------------------|----------------|-----------|------------|----------|--------------|----------|
| R-64    | 14JUL94 | B       | 11 45                   | 0                | 0              | 0.27      | 65         | 25.9     | 0.09         | 1.31     |
|         |         |         | 12 45                   | 60               | 60             | 0.16      | 69         | 25.7     | 0.49         | 1.37     |
|         |         |         | 13 45                   | 60               | 120            | 0.12      | 73         | 25.5     | 0.10         | 1.25     |
|         |         |         | 14 45                   | 60               | 180            | 0.09      | 77         | 25.7     | 0.10         | 1.24     |
|         |         |         | 15 45                   | 60               | 240            | 0.06      | 81         | 26.4     | 0.12         | 1.23     |
|         |         | 1       | 11 45                   | 0                | 0              | 0.19      | 67         | 27.0     | 0.24         | 1.68     |
|         |         |         | 12 45                   | 60               | 60             | 0.06      | 71         | 28.0     | 0.26         | 1.97     |
|         |         |         | 13 45                   | 60               | 120            | 0.05      | 75         | 30.6     | 0.39         | 2.23     |
|         |         |         | 14 45                   | 60               | 180            | 0.04      | 79         | 32.0     | 0.36         | 2.45     |
|         |         |         | 15 45                   | 60               | 240            | 0.04      | 83         | 34.0     | 0.12         | 2.66     |
|         |         | 2       | 11 45                   | 0                | 0              | 0.13      | 66         | 27.8     | 0.19         | 1.61     |
|         |         |         | 12 45                   | 60               | 60             | 0.06      | 70         | 28.7     | 0.10         | 2.03     |
|         |         |         | 13 45                   | 60               | 120            | 0.05      | 74         | 31.6     | 0.11         | 2.29     |
|         |         |         | 14 45                   | 60               | 180            | 0.04      | 78         | 33.4     | 0.13         | 2.50     |
|         |         |         | 15 45                   | 60               | 240            | 0.04      | 82         | 35.7     | 0.27         | 2.73     |
|         |         | 3       | 11 45                   | 0                | 0              | 0.27      | 68         | 27.4     | 0.12         | 1.80     |
|         |         |         | 12 45                   | 60               | 60             | 0.13      | 72         | 29.2     | 0.73         | 2.07     |
|         |         |         | 13 45                   | 60               | 120            | 0.10      | 76         | 30.8     | 0.35         | 2.34     |
|         |         |         | 14 45                   | 60               | 180            | 0.09      | 80         | 31.4     | 0.97         | 2.63     |
|         |         |         | 15 45                   | 60               | 240            | 0.09      | 84         | 33.2     | 0.29         | 2.71     |

R 64 JULY 1994 continued

| Si(OH) <sub>4</sub><br>(μM) | DOC<br>(mg/L) | TCO <sub>2</sub><br>(μM) | DON<br>(μg/L) | TDN<br>(μg/L) | DOP<br>(μg/L) | TDP<br>(μg/L) | pH   | Fe<br>(μM) | Mn<br>(μM) |
|-----------------------------|---------------|--------------------------|---------------|---------------|---------------|---------------|------|------------|------------|
| 39.4                        | 2.00          | 1689.9                   | 23.6          | 49.6          | 0.38          | 1.69          | 7.32 | 3.76       | 2.20       |
| 39.5                        | 1.97          | 1691.3                   | 22.4          | 48.6          | 0.28          | 1.65          | 7.23 | 3.40       | 2.13       |
| 40.2                        | 2.02          | 1688.2                   | 22.7          | 48.3          | 0.36          | 1.61          | 7.31 | 3.40       | 2.24       |
| 39.9                        | 1.96          | 1680.8                   | 22.9          | 48.7          | 0.43          | 1.67          | 7.33 | 3.22       | 2.13       |
| 39.9                        | 1.94          | 1675.3                   | 27.3          | 53.8          | 0.42          | 1.65          | 7.42 | 3.22       | 2.17       |
| 42.1                        | 1.99          | 1709.0                   | 24.0          | 51.2          | 0.22          | 1.90          | 7.37 | 3.76       | 2.20       |
| 45.3                        | 2.00          | 1722.2                   | 26.2          | 54.5          | 0.31          | 2.28          | 7.36 | 3.76       | 2.18       |
| 47.6                        | 2.03          | 1730.1                   | 23.8          | 54.8          | 0.44          | 2.67          | 7.40 | 3.76       | 2.26       |
| 49.4                        | 2.02          | 1737.2                   | 26.7          | 59.1          | 0.50          | 2.95          | 7.46 | 3.76       | 2.28       |
| 50.9                        | 2.07          | 1731.2                   | 28.3          | 62.4          | 0.51          | 3.17          | 7.53 | 3.94       | 2.26       |
| 41.8                        | 2.02          | 1701.8                   | 24.2          | 52.2          | 0.52          | 2.13          | 7.35 | 3.94       | 2.17       |
| 44.2                        | 2.20          | 1722.8                   | 25.1          | 53.9          | 0.44          | 2.47          | 7.33 | 3.40       | 2.18       |
| 46.6                        | 2.05          | 1735.4                   | 24.2          | 55.9          | 0.41          | 2.70          | 7.37 | 3.40       | 2.38       |
| 47.9                        | 1.94          | 1743.4                   | 30.9          | 64.4          | 0.75          | 3.25          | 7.42 | 3.58       | 2.28       |
| 49.4                        | 2.08          | 1745.2                   | 28.9          | 64.9          | 0.71          | 3.44          | 7.49 | 3.76       | 2.28       |
| 43.1                        | 2.01          | 1708.5                   | 24.4          | 51.9          | 0.36          | 2.16          | 7.40 | 3.94       | 2.26       |
| 49.3                        | 2.10          | 1722.0                   | 22.9          | 52.8          | 0.47          | 2.54          | 7.40 | 3.58       | 2.22       |
| 52.4                        | 2.00          | 1730.5                   | 23.9          | 55.0          | 0.38          | 2.72          | 7.45 | 3.40       | 2.22       |
| 53.6                        | 2.07          | 1730.1                   | 26.3          | 58.7          | 0.28          | 2.91          | 7.51 | 3.40       | 2.33       |
| 55.1                        | 2.03          | 1726.9                   | 27.0          | 60.5          | 0.64          | 3.35          | 7.59 | 3.58       | 2.31       |

Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Core Data: Dissolved nutrient and oxygen concentrations in sediment - water flux chambers

| STATION | DATE   | CORE NO | TIME OF SAMPLE (hr min) | TIME DELTA (min) | TIME SUM (min) | DO (mg/L) | AA VIAL NO | NH4 (μM) | NO2+NO3 (μM) | DIP (μM) |
|---------|--------|---------|-------------------------|------------------|----------------|-----------|------------|----------|--------------|----------|
| HGK     | 9AUG94 | B       | 10 50                   | 0                | 0              | 7.48      | 170        | 3.7      | 109.40       | 0.29     |
|         |        |         | 11 50                   | 60               | 60             | 7.24      | 174        | 3.7      | 109.80       | 0.27     |
|         |        |         | 12 50                   | 60               | 120            | 7.19      | 178        | 3.6      | 109.70       | 0.33     |
|         |        |         | 13 50                   | 60               | 180            | 7.12      | 183        | 3.7      | 109.40       | 0.29     |
|         |        |         | 14 50                   | 60               | 240            | 7.10      | 191        | 3.9      | 109.70       | 0.30     |
|         |        | 1       | 10 50                   | 0                | 0              | 7.21      | 171        | 14.6     | 107.30       | 0.26     |
|         |        |         | 11 50                   | 60               | 60             | 6.50      | 175        | 21.0     | 105.40       | 0.27     |
|         |        |         | 12 50                   | 60               | 120            | 6.02      | 179        | 25.6     | 104.60       | 0.26     |
|         |        |         | 13 50                   | 60               | 180            | 5.62      | 184        | 29.6     | 103.70       | 0.26     |
|         |        |         | 14 50                   | 60               | 240            | 5.27      | 192        | 33.2     | 102.50       | 0.31     |
|         |        | 2       | 10 50                   | 0                | 0              | 7.12      | 172        | 13.9     | 108.10       | 0.28     |
|         |        |         | 11 50                   | 60               | 60             | 6.46      | 176        | 20.3     | 80.90        | 0.27     |
|         |        |         | 12 50                   | 60               | 120            | 6.06      | 180        | 26.9     | 104.70       | 0.29     |
|         |        |         | 13 50                   | 60               | 180            | 5.70      | 185        | 31.9     | 103.70       | 0.26     |
|         |        |         | 14 50                   | 60               | 240            | 5.41      | 193        | 37.6     | 102.60       | 0.25     |
|         |        | 3       | 10 50                   | 0                | 0              | 7.30      | 173        | 9.4      | 107.60       | 0.25     |
|         |        |         | 11 50                   | 60               | 60             | 6.48      | 177        | 17.2     | 106.00       | 0.27     |
|         |        |         | 12 50                   | 60               | 120            | 5.99      | 181        | 21.4     | 105.10       | 0.28     |
|         |        |         | 13 50                   | 60               | 180            | 5.57      | 186        | 24.8     | 103.50       | 0.29     |
|         |        |         | 14 50                   | 60               | 240            | 5.21      | 194        | 27.1     | 102.70       | 0.31     |

## HGNK AUGUST 1994 continued

| Si(OH) <sub>4</sub><br>(μM) | DOC<br>(mg/L) | TCO <sub>2</sub><br>(μM) | DON<br>(μg/L) | TDN<br>(μg/L) | DOP<br>(μg/L) | TDP<br>(μg/L) | pH   | Fe<br>(μM) | Mn<br>(μM) |
|-----------------------------|---------------|--------------------------|---------------|---------------|---------------|---------------|------|------------|------------|
| 10.1                        | 3.59          | 1738.4                   | 25.2          | 138.3         | 0.33          | 0.62          | 7.64 | 0.72       | -0.02      |
| 10.9                        | 3.67          |                          | 24.8          | 138.3         | 0.35          | 0.62          | 7.70 | 0.18       | -0.05      |
| 11.3                        | 3.66          | 1714.9                   | 24.5          | 137.8         | 0.33          | 0.66          | 7.71 | 0.18       | 0.00       |
| 10.9                        | 3.68          |                          | 25.4          | 138.5         | 0.33          | 0.62          | 7.66 | 0.18       | -0.02      |
| 10.6                        | 3.51          | 1717.8                   | 23.4          | 137.0         | 0.32          | 0.62          | 7.65 | 0.18       | 0.02       |
| 13.6                        | 3.57          | 1807.1                   | 25.6          | 147.5         | 0.39          | 0.65          | 7.52 | 0.00       | 1.31       |
| 15.9                        | 3.67          | 1853.2                   | 23.2          | 149.6         | 0.40          | 0.67          | 7.47 | 0.00       | 1.86       |
| 17.9                        | 3.69          | 1872.6                   | 26.9          | 157.1         | 0.38          | 0.64          | 7.43 | 0.18       | 2.11       |
| 19.3                        | 3.78          | 1903.4                   | 22.9          | 156.2         | 0.41          | 0.67          | 7.36 | 0.36       | 2.18       |
| 18.7                        | 3.75          | 1943.7                   | 29.9          | 165.6         | 0.41          | 0.72          | 7.33 | 0.18       | 2.26       |
| 12.4                        | 3.62          | 1777.6                   | 23.5          | 145.5         | 0.33          | 0.61          | 7.49 | 0.18       | 1.26       |
| 15.1                        | 3.70          | 1837.8                   | 50.0          | 151.2         | 0.37          | 0.64          | 7.41 | 0.18       | 1.82       |
| 16.9                        | 3.70          | 1867.0                   | 24.6          | 156.2         | 0.34          | 0.63          | 7.36 | 0.18       | 2.62       |
| 18.0                        | 3.72          | 1903.2                   | 23.9          | 159.5         | 0.33          | 0.59          | 7.28 | 0.18       | 2.97       |
| 19.3                        | 3.66          | 1931.1                   | 23.0          | 163.2         | 0.34          | 0.59          | 7.25 | 0.18       | 3.31       |
| 13.4                        | 3.68          | 1780.0                   | 27.0          | 144.0         | 0.46          | 0.71          | 7.56 | 0.18       | 1.24       |
| 16.0                        | 3.76          | 1815.6                   | 20.5          | 143.7         | 0.37          | 0.64          | 7.47 | 0.00       | 1.64       |
| 17.1                        | 3.73          | 1849.9                   | 24.0          | 150.5         | 1.59          | 1.87          | 7.40 | 0.00       | 1.86       |
| 17.4                        | 3.72          | 1872.9                   | 23.8          | 152.1         | 0.38          | 0.67          | 7.37 | 0.00       | 1.82       |
| 17.6                        | 3.73          | 1901.4                   | 31.4          | 161.2         | 0.37          | 0.68          | 7.32 | 0.18       | 1.97       |

# Numerical Water Quality and Contaminant Modeling (EL-22)

Tidal Fresh Potomac River and Maryland Mainstem

Core Data: Dissolved nutrient and oxygen concentrations in sediment - water flux chambers

| STATION | DATE   | CORE NO | TIME OF SAMPLE<br>(hr min) | TIME DELTA<br>(min) | TIME SUM<br>(min) | DO<br>(mg/L) | AA<br>VIAL NO | NH4<br>( $\mu$ M) | NO2+NO3<br>( $\mu$ M) | DIP<br>( $\mu$ M) |
|---------|--------|---------|----------------------------|---------------------|-------------------|--------------|---------------|-------------------|-----------------------|-------------------|
| GNCV    | 9AUG94 | B       | 14 15                      | 0                   | 0                 | 8.89         | 187           | 0.5               | 58.20                 | 0.63              |
|         |        |         | 15 20                      | 65                  | 65                | 8.68         | 195           | 0.4               | 57.90                 | 0.78              |
|         |        |         | 16 20                      | 60                  | 125               | 8.57         | 199           | 0.7               | 58.40                 | 0.79              |
|         |        |         | 17 20                      | 60                  | 185               | 8.47         | 204           | 0.6               | 58.70                 | 0.71              |
|         |        |         | 18 20                      | 60                  | 245               | 8.43         | 209           | 0.9               | 54.60                 | 0.68              |
|         |        |         |                            |                     |                   |              |               |                   |                       |                   |
|         |        | 1       | 14 15                      | 0                   | 0                 | 8.51         | 188           | 3.3               | 58.30                 | 0.55              |
|         |        |         | 15 20                      | 65                  | 65                | 7.76         | 196           | 6.3               | 57.50                 | 0.95              |
|         |        |         | 16 20                      | 60                  | 125               | 7.23         | 200           | 9.8               | 57.40                 | 0.83              |
|         |        |         | 17 20                      | 60                  | 185               | 6.70         | 205           | 12.2              | 57.00                 | 0.70              |
|         |        |         | 18 20                      | 60                  | 245               | 6.23         | 210           | 11.9              | 48.40                 | 0.99              |
|         |        |         |                            |                     |                   |              |               |                   |                       |                   |
|         |        | 2       | 14 15                      | 0                   | 0                 | 8.83         | 189           | 1.5               | 58.60                 | 0.78              |
|         |        |         | 15 20                      | 65                  | 65                | 8.14         | 197           | 2.7               | 58.60                 | 0.65              |
|         |        |         | 16 20                      | 60                  | 125               | 7.64         | 201           | 4.0               | 58.40                 | 0.76              |
|         |        |         | 17 20                      | 60                  | 185               | 7.18         | 206           | 5.3               | 58.20                 | 0.71              |
|         |        |         | 18 20                      | 60                  | 245               | 6.78         | 211           | 6.7               | 58.50                 | 0.78              |
|         |        |         |                            |                     |                   |              |               |                   |                       |                   |
|         |        | 3       | 14 15                      | 0                   | 0                 | 8.76         | 190           | 4.4               | 58.70                 | 0.81              |
|         |        |         | 15 20                      | 65                  | 65                | 8.02         | 198           | 8.1               | 58.40                 | 0.89              |
|         |        |         | 16 20                      | 60                  | 125               | 7.43         | 202           | 12.0              | 57.80                 | 0.93              |
|         |        |         | 17 20                      | 60                  | 185               | 6.69         | 207           | 15.0              | 58.40                 | 0.94              |
|         |        |         | 18 20                      | 60                  | 245               | 6.19         | 212           | 16.9              | 56.70                 | 0.91              |
|         |        |         |                            |                     |                   |              |               |                   |                       |                   |

GNCV AUGUST 1994 continued

| Si(OH) <sub>4</sub><br>(μM) | DOC<br>(mg/L) | TCO <sub>2</sub><br>(μM) | DON<br>(μg/L) | TDN<br>(μg/L) | DOP<br>(μg/L) | TDP<br>(μg/L) | pH   | Fe<br>(μM) | Mn<br>(μM) |
|-----------------------------|---------------|--------------------------|---------------|---------------|---------------|---------------|------|------------|------------|
| 2.5                         | 3.90          | 1572.4                   | 22.6          | 81.3          | 0.25          | 0.88          | 8.32 | 0.00       | 0.05       |
| 2.3                         | 3.98          | 1497.5                   | 23.0          | 81.3          | 0.15          | 0.93          | 8.29 | 0.00       | 0.05       |
| 1.5                         | 4.23          |                          | 22.3          | 81.4          | 0.16          | 0.95          | 8.27 | 0.00       | 0.05       |
| 2.3                         | 3.97          | 1513.4                   | 22.4          | 81.7          | 0.28          | 0.99          | 8.23 | 0.00       | 0.05       |
| 1.6                         | 3.89          | 1528.3                   | 25.3          | 80.8          | 0.23          | 0.91          | 8.16 | 0.00       | 0.05       |
| 2.9                         | 4.00          | 1552.5                   | 22.5          | 84.1          | 0.43          | 0.98          | 8.23 | 0.18       | 0.13       |
| 5.6                         | 4.48          | 1602.0                   | 23.8          | 87.6          | 0.12          | 1.07          | 8.10 | 0.18       | 0.31       |
| 6.6                         | 4.20          | 1646.5                   | 21.4          | 88.6          | 0.29          | 1.12          | 7.96 | 0.18       | 0.47       |
| 8.5                         | 4.49          | 1695.6                   | 24.3          | 93.5          | 0.48          | 1.18          | 7.79 | 0.00       | 0.58       |
| 8.6                         | 4.36          | 1742.9                   | 33.0          | 93.3          | 0.22          | 1.21          | 7.69 | 0.36       | 0.71       |
| 2.7                         | 4.00          | 1545.9                   | 23.3          | 83.4          | 0.13          | 0.91          | 8.31 | 0.00       | 0.09       |
| 3.6                         | 4.35          | 1569.7                   | 24.8          | 86.1          | 0.39          | 1.04          | 8.22 | 0.00       | 0.09       |
| 4.0                         | 4.18          | 1625.4                   | 21.7          | 84.1          | 0.26          | 1.02          | 8.15 | 0.18       | 0.11       |
| 4.8                         | 4.14          | 1636.1                   | 23.3          | 86.8          | 0.39          | 1.10          | 8.05 | 0.00       | 0.07       |
| 5.4                         | 4.34          | 1665.3                   | 21.5          | 86.7          | 0.32          | 1.10          | 8.00 | 0.00       | 0.13       |
| 4.9                         | 4.00          | 1552.2                   | 22.3          | 85.4          | 0.11          | 0.92          | 8.27 | 0.18       | 0.44       |
| 6.1                         | 4.31          | 1639.6                   | 21.6          | 88.1          | 0.13          | 1.02          | 8.13 | 0.00       | 0.53       |
| 8.0                         | 4.25          | 1669.1                   | 21.5          | 91.3          | 0.15          | 1.08          | 7.91 | 0.18       | 0.87       |
| 10.2                        | 4.25          |                          | 23.2          | 96.6          | 0.16          | 1.10          | 7.80 | 0.00       | 0.86       |
| 10.1                        | 4.40          | 1768.0                   | 23.5          | 97.1          | 0.25          | 1.16          | 7.74 | 0.72       | 1.07       |

# Numerical Water Quality and Contaminant Modeling (EL-22)

Tidal Fresh Potomac River and Maryland Mainstem

Core Data: Dissolved nutrient and oxygen concentrations in sediment - water flux chambers

| STATION | DATE    | CORE NO | TIME OF SAMPLE<br>(hr min) | TIME DELTA<br>(min) | TIME SUM<br>(min) | DO<br>(mg/L) | AA<br>VIAL NO | NH4<br>(μM) | NO2+NO3<br>(μM) | DIP<br>(μM) |
|---------|---------|---------|----------------------------|---------------------|-------------------|--------------|---------------|-------------|-----------------|-------------|
| MDPT    | 10AUG94 | B       | 11                         | 0                   | 0                 | 5.38         | 214           | 3.8         | 8.71            | 1.95        |
|         |         |         | 12                         | 0                   | 60                | 5.33         | 218           | 3.7         | 8.53            | 1.96        |
|         |         |         | 13                         | 0                   | 120               | 5.31         | 222           | 3.9         | 8.62            | 1.96        |
|         |         |         | 14                         | 0                   | 180               | 5.35         | 226           | 4.6         | 8.95            | 1.88        |
|         |         |         | 15                         | 0                   | 240               | 5.31         | 230           | 6.4         | 8.68            | 2.00        |
|         |         | 1       | 11                         | 0                   | 0                 | 5.37         | 215           | 4.8         | 8.62            | 1.95        |
|         |         |         | 12                         | 0                   | 60                | 5.02         | 219           | 6.0         | 8.97            | 1.99        |
|         |         |         | 13                         | 0                   | 120               | 4.76         | 223           | 8.6         | 9.39            | 2.04        |
|         |         |         | 14                         | 0                   | 180               | 4.53         | 227           | 8.6         | 9.07            | 1.99        |
|         |         |         | 15                         | 0                   | 240               | 4.32         | 231           | 11.2        | 9.59            | 1.92        |
|         |         | 2       | 11                         | 0                   | 0                 | 5.26         | 216           | 6.2         | 8.71            | 2.07        |
|         |         |         | 12                         | 0                   | 60                | 4.95         | 220           | 8.9         | 9.01            | 2.12        |
|         |         |         | 13                         | 0                   | 120               | 4.73         | 224           | 10.4        | 9.29            | 2.11        |
|         |         |         | 14                         | 0                   | 180               | 4.55         | 228           | 11.5        | 10.06           | 2.20        |
|         |         |         | 15                         | 0                   | 240               | 4.40         | 232           | 12.8        | 9.91            | 2.11        |
|         |         | 3       | 11                         | 0                   | 0                 | 5.34         | 217           | 6.6         | 8.45            | 2.05        |
|         |         |         | 12                         | 0                   | 60                | 4.76         | 221           | 10.3        | 8.33            | 2.04        |
|         |         |         | 13                         | 0                   | 120               | 4.37         | 225           | 14.4        | 8.30            | 2.03        |
|         |         |         | 14                         | 0                   | 180               | 4.05         | 229           | 17.4        | 8.77            | 2.03        |
|         |         |         | 15                         | 0                   | 240               | 3.75         | 233           | 24.9        | 7.95            | 2.11        |

MDPT AUGUST 1994 continued

| Si(OH) <sub>4</sub><br>(μM) | DOC<br>(mg/L) | TCO <sub>2</sub><br>(μM) | DON<br>(μg/L) | TDN<br>(μg/L) | DOP<br>(μg/L) | TDP<br>(μg/L) | pH   | Fe<br>(μM) | Mn<br>(μM) |
|-----------------------------|---------------|--------------------------|---------------|---------------|---------------|---------------|------|------------|------------|
| 50.4                        | 3.22          | 1261.6                   | 21.4          | 33.9          | 0.20          | 2.15          | 7.30 | 0.00       | 0.20       |
| 48.7                        | 3.13          |                          | 23.6          | 35.8          | 0.22          | 2.18          | 7.25 | 0.18       | 0.20       |
| 50.3                        | 3.19          | 1262.8                   | 22.4          | 34.9          | 0.30          | 2.26          | 7.34 | 0.18       | 0.18       |
| 50.6                        | 3.30          |                          | 21.3          | 34.8          | 0.33          | 2.21          | 7.27 | 0.00       | 0.18       |
| 50.7                        | 3.45          | 1271.6                   | 19.7          | 34.8          | 0.21          | 2.21          | 7.23 | 0.18       | 0.16       |
| 50.2                        | 3.23          | 1279.9                   | 21.3          | 34.7          | 0.30          | 2.25          | 7.30 | 0.00       | 1.15       |
| 50.0                        | 3.50          | 1279.7                   | 21.0          | 36.0          | 0.14          | 2.13          | 7.31 | 0.18       | 2.17       |
| 55.3                        | 3.23          | 1292.0                   | 20.2          | 38.2          | 0.18          | 2.22          | 7.28 | 0.18       | 2.97       |
| 55.9                        | 3.58          | 1303.7                   | 24.5          | 42.2          | 0.29          | 2.28          | 7.21 | 0.18       | 3.82       |
| 57.0                        | 3.52          | 1316.5                   | 22.7          | 43.5          | 0.31          | 2.23          | 7.19 | 0.18       | 4.59       |
| 53.1                        | 3.27          | 1282.1                   | 21.9          | 36.8          | 0.24          | 2.31          | 7.32 | 0.00       | 1.67       |
| 55.1                        | 3.50          | 1308.8                   | 21.5          | 39.4          | 0.25          | 2.37          | 7.44 | 0.00       | 3.00       |
| 59.9                        | 3.26          | 1343.0                   | 23.1          | 42.8          | 0.27          | 2.38          | 7.30 | 0.00       | 4.11       |
| 62.0                        | 3.33          | 1363.1                   | 22.7          | 44.3          | 0.23          | 2.43          | 7.33 | 0.00       | 4.62       |
| 67.8                        | 3.48          | 1388.1                   | 22.8          | 45.5          | 0.32          | 2.43          | 7.25 | -0.18      | 5.28       |
| 53.0                        | 3.24          | 1273.6                   | 24.4          | 39.4          | 0.25          | 2.30          | 7.34 | 0.00       | 1.87       |
| 52.1                        | 3.55          | 1287.6                   | 23.3          | 41.9          | 0.29          | 2.33          | 7.39 | 0.00       | 3.31       |
| 59.0                        | 3.28          | 1310.0                   | 22.0          | 44.7          | 0.29          | 2.32          | 7.30 | 0.36       | 4.73       |
| 65.3                        | 3.47          | 1347.8                   | 26.1          | 52.3          | 0.46          | 2.49          | 7.33 | 0.36       | 5.92       |
| 72.2                        | 3.56          | 1345.4                   | 25.0          | 57.8          | 0.32          | 2.43          | 7.23 | 0.72       | 7.12       |

Numerical Water Quality and Contaminant Modeling (EL-22)

Tidal Fresh Potomac River and Maryland Mainstem

Core Data: Dissolved nutrient and oxygen concentrations in sediment - water flux chambers

| STATION | DATE    | CORE NO | TIME OF SAMPLE (hr min) | TIME DELTA (min) | TIME SUM (min) | DO (mg/L) | AA VIAL NO | NH4 (μM) | NO2+NO3 (μM) | DIP (μM) |
|---------|---------|---------|-------------------------|------------------|----------------|-----------|------------|----------|--------------|----------|
| R-64    | 11AUG94 | B       | 11 15                   | 0                | 0              | 0.07      | 65         | 24.9     | 0.16         | 2.51     |
|         |         |         | 12 20                   | 65               | 65             | 0.05      | 69         | 24.9     | 0.16         | 2.51     |
|         |         |         | 13 20                   | 60               | 125            | 0.04      | 73         | 24.8     | 0.13         | 2.50     |
|         |         |         | 14 22                   | 62               | 187            | 0.03      | 77         | 25.0     | 0.16         | 2.49     |
|         |         |         | 15 22                   | 60               | 247            | 0.03      | 82         | 25.3     | 0.21         | 2.48     |
|         |         | 1       | 11 15                   | 0                | 0              | 0.04      | 66         | 26.3     | 0.24         | 2.87     |
|         |         |         | 12 20                   | 65               | 65             | 0.03      | 70         | 28.9     | 0.15         | 3.20     |
|         |         |         | 13 20                   | 60               | 125            | 0.03      | 74         | 29.5     | 0.14         | 3.39     |
|         |         |         | 14 22                   | 62               | 187            | 0.02      | 78         | 30.6     | 0.16         | 3.54     |
|         |         |         | 15 22                   | 60               | 247            | 0.02      | 83         | 32.0     | 0.19         | 3.72     |
|         |         | 2       | 11 15                   | 0                | 0              | 0.06      | 67         | 26.8     | 0.16         | 2.99     |
|         |         |         | 12 20                   | 65               | 65             | 0.03      | 71         | 28.5     | 0.16         | 3.29     |
|         |         |         | 13 20                   | 60               | 125            | 0.02      | 75         | 29.6     | 0.14         | 3.35     |
|         |         |         | 14 22                   | 62               | 187            | 0.02      | 79         | 30.4     | 0.18         | 3.64     |
|         |         |         | 15 22                   | 60               | 247            | 0.02      | 84         | 31.6     | 0.16         | 3.69     |
|         |         | 3       | 11 15                   | 0                | 0              | 0.08      | 68         | 27.9     | 0.16         | 3.16     |
|         |         |         | 12 20                   | 65               | 65             | 0.05      | 72         | 29.6     | 0.14         | 3.40     |
|         |         |         | 13 20                   | 60               | 125            | 0.04      | 76         | 31.9     | 0.14         | 3.57     |
|         |         |         | 14 22                   | 62               | 187            | 0.03      | 80         | 31.6     | 0.30         | 3.68     |
|         |         |         | 15 22                   | 60               | 247            | 0.03      | 85         | 33.6     | 0.19         | 3.73     |

R 64 AUGUST 1994 continued

| Si(OH) <sub>4</sub><br>(μM) | DOC<br>(mg/L) | TCO <sub>2</sub><br>(μM) | DON<br>(μg/L) | TDN<br>(μg/L) | DOP<br>(μg/L) | TDP<br>(μg/L) | pH   | Fe<br>(μM) | Mn<br>(μM) |
|-----------------------------|---------------|--------------------------|---------------|---------------|---------------|---------------|------|------------|------------|
| 44.2                        | 1.85          | 1882.2                   | 24.94         | 50.0          | 47.49         | 2.77          | 7.31 | 5.73       | 0.87       |
| 44.2                        | 1.94          | 1878.0                   | 28.54         | 53.6          | 51.09         | 2.84          | 7.35 | 5.01       | 0.62       |
| 43.9                        | 1.94          | 1877.9                   | 23.57         | 48.5          | 46.00         | 2.83          | 7.33 | 5.37       | 0.55       |
| 44.4                        | 1.91          | 1877.7                   | 24.14         | 49.3          | 46.81         | 2.79          | 7.37 | 5.37       | 0.60       |
| 44.4                        | 1.87          | 1871.6                   | 22.39         | 47.9          | 45.42         | 2.76          | 7.37 | 5.19       | 0.56       |
| 47.5                        | 1.94          | 1897.4                   | 22.76         | 49.3          | 46.43         | 3.02          | 7.35 | 4.66       | 0.56       |
| 47.3                        | 1.97          | 1922.7                   | 25.55         | 54.6          | 51.40         | 3.48          | 7.36 | 4.83       | 0.60       |
| 52.8                        | 1.96          | 1934.7                   | 26.86         | 56.5          | 53.11         | 3.69          | 7.37 | 3.76       | 0.91       |
| 55.7                        | 1.94          | 1937.4                   | 25.74         | 56.5          | 52.96         | 3.74          | 7.39 | 4.83       | 1.55       |
| 56.2                        | 1.97          | 1946.7                   | 27.41         | 59.6          | 55.88         | 4.03          | 7.41 | 5.01       | 1.66       |
| 45.5                        | 1.97          | 1900.6                   | 24.54         | 51.5          | 48.51         | 3.29          | 7.36 | 5.01       | 0.53       |
| 49.4                        | 1.87          | 1920.8                   | 25.44         | 54.1          | 50.81         | 3.60          | 7.36 | 4.48       | 0.71       |
| 50.4                        | 1.88          | 1930.9                   | 25.46         | 55.2          | 51.85         | 3.73          | 7.37 | 4.83       | 1.06       |
| 54.7                        | 2.00          | 1932.3                   | 28.42         | 59.0          | 55.36         | 3.94          | 7.39 | 4.83       | 1.60       |
| 54.8                        | 1.96          | 1941.0                   | 30.74         | 62.5          | 58.81         | 3.98          | 7.42 | 4.83       | 0.49       |
| 48.0                        | 1.89          | 1912.9                   | 24.94         | 53.0          | 49.84         | 3.48          | 7.37 | 4.66       | 0.78       |
| 52.9                        | 1.88          | 1929.3                   | 25.66         | 55.4          | 52.00         | 3.65          | 7.36 | 4.66       | 0.86       |
| 53.3                        | 1.96          | 1939.6                   | 26.26         | 58.3          | 54.73         | 3.75          | 7.37 | 4.83       | 1.37       |
| 55.4                        | 1.92          | 1942.6                   | 25.70         | 57.6          | 53.92         | 3.90          | 7.38 | 5.01       | 1.66       |
| 53.5                        | 1.95          | 1950.9                   | 31.71         | 65.5          | 61.77         | 4.19          | 7.43 | 5.19       | 1.51       |

Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem

Core Data: Dissolved nutrient and oxygen concentrations in sediment - water flux chambers

| STATION | DATE    | CORE NO | TIME OF SAMPLE (hr min) | TIME DELTA (min) | TIME SUM (min) | DO (mg/L) | AA VIAL NO | NH4 (μM) | NO2+NO3 (μM) | DIP (μM) |
|---------|---------|---------|-------------------------|------------------|----------------|-----------|------------|----------|--------------|----------|
| HGK     | 13OCT94 | B       | 10 15                   | 0                | 0              | 8.11      | 171        | 12.1     | 202.00       | 0.34     |
|         |         |         | 11 15                   | 60               | 60             | 8.05      | 175        | 12.2     | 202.00       | 0.34     |
|         |         |         | 12 17                   | 62               | 122            | 8.05      | 180        | 11.9     | 198.00       | 0.34     |
|         |         |         | 13 17                   | 60               | 182            | 8.07      | 184        | 11.8     | 197.00       | 0.59     |
|         |         | 1       | 14 15                   | 58               | 240            | 8.08      | 188        | 12.3     | 193.00       | 0.35     |
|         |         |         | 10 15                   | 0                | 0              | 8.06      | 172        | 18.3     | 219.00       | 0.35     |
|         |         |         | 11 15                   | 60               | 60             | 7.61      | 176        | 22.3     | 203.00       | 0.36     |
|         |         |         | 12 17                   | 62               | 122            | 7.27      | 181        | 26.0     | 202.00       | 0.35     |
|         |         |         | 13 17                   | 60               | 182            | 6.99      | 185        | 29.0     | 198.00       | 0.38     |
|         |         |         | 14 15                   | 58               | 240            | 6.76      | 189        | 31.1     | 198.00       | 0.37     |
|         |         | 2       | 10 15                   | 0                | 0              | 7.78      | 173        | 19.5     | 204.00       | 0.37     |
|         |         |         | 11 15                   | 60               | 60             | 7.44      | 177        | 23.5     | 203.00       | 0.35     |
| HGK     | 13OCT94 | 3       | 12 17                   | 62               | 122            | 7.15      | 182        | 27.1     | 202.00       | 0.37     |
|         |         |         | 13 17                   | 60               | 182            | 6.93      | 186        | 29.6     | 204.00       | 0.35     |
|         |         |         | 14 15                   | 58               | 240            | 6.71      | 190        | 32.9     | 201.00       | 0.34     |
|         |         |         | 10 15                   | 0                | 0              | 7.86      | 174        | 18.9     | 208.00       | 0.32     |
|         |         | 3       | 11 15                   | 60               | 60             | 7.53      | 178        | 23.8     | 204.00       | 0.36     |
|         |         |         | 12 17                   | 62               | 122            | 7.27      | 183        | 26.0     | 203.00       | 0.34     |
|         |         |         | 13 17                   | 60               | 182            | 7.06      | 187        | 30.0     | 202.00       | 0.35     |
|         |         |         | 14 15                   | 58               | 240            | 6.88      | 191        | 32.3     | 201.00       | 0.35     |

HGNK OCTOBER 1994 continued

| Si(OH) <sub>4</sub><br>(μM) | DOC<br>(mg/L) | TCO <sub>2</sub><br>(μM) | DON<br>(μg/L) | TDN<br>(μg/L) | DOP<br>(μg/L) | TDP<br>(μg/L) | pH   | Fe<br>(μM) | Mn<br>(μM) |
|-----------------------------|---------------|--------------------------|---------------|---------------|---------------|---------------|------|------------|------------|
| 49.9                        | 3.08          | 1931.2                   | 24.9          | 239           | 0.23          | 0.57          | 7.74 | 0.36       | 0.66       |
| 51.4                        | 3.05          |                          | 27.8          | 242           | 0.27          | 0.61          | 7.72 | -0.18      | 0.05       |
| 57.8                        | 3.03          | 1934.2                   | 19.1          | 229           | 0.25          | 0.59          | 7.64 | -0.18      | 0.55       |
| 67.0                        | 2.98          |                          | 25.2          | 234           | -0.03         | 0.56          | 7.62 | -0.36      | 0.51       |
| 76.1                        | 3.01          | 1968.3                   | 27.7          | 233           | 0.22          | 0.57          | 7.74 | -0.18      | 0.56       |
| 50.1                        | 3.16          | 1963.8                   | 5.7           | 243           | 0.23          | 0.58          | 7.69 | 0.00       | 1.22       |
| 51.1                        | 3.25          | 1974.0                   | 18.7          | 244           | 0.27          | 0.63          | 7.61 | -0.18      | 1.40       |
| 50.5                        | 3.11          | 2000.7                   | 22.0          | 250           | 0.23          | 0.58          | 7.50 | -0.36      | 1.60       |
| 52.2                        | 3.17          | 2018.5                   | 24.0          | 251           | 0.23          | 0.61          | 7.50 | -0.36      | 1.69       |
| 54.0                        | 3.16          | 2039.5                   | 22.9          | 252           | 0.27          | 0.64          | 7.57 | -0.36      | 1.73       |
| 48.8                        | 3.16          | 1975.5                   | 26.5          | 250           | 0.22          | 0.59          | 7.67 | -0.36      | 1.20       |
| 49.9                        | 3.19          | 1980.5                   | 20.5          | 247           | 0.23          | 0.58          | 7.59 | -0.36      | 1.35       |
| 51.4                        | 3.07          | 1995.5                   | 21.9          | 251           | 0.25          | 0.62          | 7.50 | -0.54      | 1.47       |
| 49.6                        | 3.16          | 2014.7                   | 20.4          | 254           | 0.23          | 0.58          | 7.50 | -0.54      | 1.58       |
| 51.0                        | 3.17          | 2026.6                   | 21.1          | 255           | 0.25          | 0.59          | 7.55 | -0.72      | 1.67       |
| 49.4                        | 3.18          | 1952.4                   | 16.1          | 243           | 0.27          | 0.59          | 7.70 | -0.18      | 1.11       |
| 50.3                        | 3.14          | 1974.5                   | 18.2          | 246           | 0.25          | 0.61          | 7.59 | -0.54      | 1.33       |
| 50.4                        | 3.15          | 1998.5                   | 19.0          | 248           | 0.25          | 0.59          | 7.56 | -0.54      | 1.37       |
| 49.2                        | 3.16          | 2008.3                   | 19.0          | 251           | 0.25          | 0.60          | 7.54 | -0.72      | 1.46       |
| 51.0                        | 3.15          | 2024.0                   | 21.7          | 255           | 0.26          | 0.61          | 7.57 | -0.54      | 1.51       |

Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Core Data: Dissolved nutrient and oxygen concentrations in sediment - water flux chambers

| STATION | DATE    | CORE NO | TIME OF SAMPLE (hr min) | TIME DELTA (min) | TIME SUM (min) | DO (mg/L) | AA VIAL NO | NH4 (μM) | NO2+NO3 (μM) | DIP (μM) |
|---------|---------|---------|-------------------------|------------------|----------------|-----------|------------|----------|--------------|----------|
| GNCV    | 13OCT94 | B       | 13 53                   | 0                | 0              | 9.91      | 192        | 0.6      | 137.00       | 0.15     |
|         |         |         | 14 55                   | 62               | 62             | 9.83      | 196        | 0.1      | 137.00       | 0.15     |
|         |         |         | 15 55                   | 60               | 122            | 9.79      | 200        | 0.6      | 137.00       | 0.13     |
|         |         |         | 16 55                   | 60               | 182            | 9.76      | 205        | 0.1      | 137.00       | 0.14     |
|         |         |         | 17 55                   | 60               | 242            | 9.71      | 210        | 0.3      | 136.00       | 0.14     |
|         |         | 1       | 13 53                   | 0                | 0              | 9.36      | 193        | 2.1      | 136.00       | 0.17     |
|         |         |         | 14 55                   | 62               | 62             | 8.92      | 197        | 2.9      | 136.00       | 0.16     |
|         |         |         | 15 55                   | 60               | 122            | 8.66      | 201        | 3.7      | 136.00       | 0.16     |
|         |         |         | 16 55                   | 60               | 182            | 8.42      | 206        | 4.0      | 135.00       | 0.17     |
|         |         |         | 17 55                   | 60               | 242            | 8.17      | 211        | 4.6      | 134.00       | 0.18     |
|         |         | 2       | 13 53                   | 0                | 0              | 9.08      | 194        | 4.2      | 135.00       | 0.15     |
|         |         |         | 14 55                   | 62               | 62             | 8.63      | 198        | 6.1      | 136.00       | 0.19     |
|         |         |         | 15 55                   | 60               | 122            | 8.32      | 202        | 7.5      | 134.00       | 0.18     |
|         |         |         | 16 55                   | 60               | 182            | 8.01      | 207        | 9.6      | 132.00       | 0.37     |
|         |         |         | 17 55                   | 60               | 242            | 7.73      | 212        | 9.6      | 131.00       | 0.21     |
|         |         | 3       | 13 53                   | 0                | 0              | 9.63      | 195        | 1.4      | 136.00       | 0.16     |
|         |         |         | 14 55                   | 62               | 62             | 9.22      | 199        | 2.2      | 136.00       | 0.15     |
|         |         |         | 15 55                   | 60               | 122            | 8.92      | 203        | 3.2      | 136.00       | 0.17     |
|         |         |         | 16 55                   | 60               | 182            | 8.67      | 208        | 3.8      | 135.00       | 0.20     |
|         |         |         | 17 55                   | 60               | 242            | 8.42      | 213        | 3.5      | 134.00       | 0.17     |

GNCV OCTOBER 1994 continued

| Si(OH) <sub>4</sub><br>(μM) | DOC<br>(mg/L) | TCO <sub>2</sub><br>(μM) | DON<br>(μg/L) | TDN<br>(μg/L) | DOP<br>(μg/L) | TDP<br>(μg/L) | pH   | Fe<br>(μM) | Mn<br>(μM) |
|-----------------------------|---------------|--------------------------|---------------|---------------|---------------|---------------|------|------------|------------|
| 27.4                        | 3.42          | 1648.7                   | 25.4          | 163.0         | 0.15          | 0.30          | 8.12 | -0.72      | 0.51       |
| 26.3                        | 3.47          | 1729.4                   | 23.9          | 161.0         | 0.16          | 0.31          | 8.13 | -0.72      | 0.49       |
| 27.6                        | 3.46          | HH                       | 24.4          | 162.0         | 0.28          | 0.41          | 8.05 | -0.90      | 0.53       |
| 26.6                        | 3.54          | 1650.4                   | 22.9          | 160.0         | 0.24          | 0.38          | 8.06 | -0.72      | 0.49       |
| 29.5                        | 3.46          | 1664.4                   | 25.7          | 162.0         | 0.17          | 0.31          | 8.14 | -0.72      | 0.51       |
| 27.9                        | 3.52          | 1691.7                   | 22.9          | 161.0         | 0.19          | 0.36          | 8.19 | -0.54      | 0.60       |
| 27.8                        | 3.58          | 1723.7                   | 24.1          | 163.0         | 0.23          | 0.39          | 8.16 | -0.72      | 0.60       |
| 29.6                        | 3.48          | 1741.4                   | 21.3          | 161.0         | 0.24          | 0.40          | 8.04 | -0.90      | 0.55       |
| 27.9                        | 3.54          | 1774.3                   | 22.0          | 161.0         | 0.22          | 0.39          | 7.91 | -0.90      | 0.56       |
| 28.2                        | 3.53          | 1789.3                   | 24.4          | 163.0         | 0.28          | 0.46          | 7.98 | -0.72      | 0.58       |
| 29.7                        | 3.64          | 1715.5                   | 25.8          | 165.0         | 0.31          | 0.46          | 8.13 | -0.54      | 0.86       |
| 33.2                        | 4.00          | 1765.4                   | 32.9          | 175.0         | 1.37          | 1.56          | 8.06 | -0.90      | 0.87       |
| 34.8                        | 3.48          | 1795.1                   | 26.5          | 168.0         | 0.20          | 0.38          | 7.95 | -0.90      | 0.91       |
| 35.6                        | 4.12          | 1844.8                   | 21.4          | 163.0         | 0.06          | 0.43          | 7.73 | -0.72      | 0.95       |
| 37.5                        | 3.55          | 1866.7                   | 24.4          | 165.0         | 0.18          | 0.39          | 7.83 | -0.72      | 0.98       |
| 27.9                        | 3.55          | 1684.1                   | 26.6          | 164.0         | 0.19          | 0.35          | 8.07 | -0.54      | 0.60       |
| 27.8                        | 3.48          | 1715.7                   | 22.8          | 161.0         | 0.25          | 0.40          | 8.18 | -0.72      | 0.56       |
| 26.9                        | 3.65          | 1737.1                   | 23.8          | 163.0         | 0.33          | 0.50          | 8.05 | -0.72      | 0.55       |
| 26.7                        | 3.60          | 1777.7                   | 20.2          | 159.0         | 0.20          | 0.40          | 7.89 | -0.72      | 0.51       |
| 27.7                        | 3.52          | 1779.6                   | 26.5          | 164.0         | 0.31          | 0.48          | 8.00 | -0.72      | 0.51       |

Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem

Core Data: Dissolved nutrient and oxygen concentrations in sediment - water flux chambers

| STATION | DATE    | CORE NO | TIME OF SAMPLE |     | TIME DELTA (min) | TIME SUM (min) | DO (mg/L) | AA VIAL NO | NH4 (μM) | NO2+NO3 (μM) | DIP (μM) |
|---------|---------|---------|----------------|-----|------------------|----------------|-----------|------------|----------|--------------|----------|
|         |         |         | hr             | min |                  |                |           |            |          |              |          |
| MDPT    | 14OCT94 | B       | 11             | 10  | 0                | 0              | 7.54      | 215        | 7.5      | 40.10        | 1.84     |
|         |         |         | 12             | 20  | 70               | 70             | 7.49      | 219        | 8.0      | 39.80        | 1.87     |
|         |         |         | 13             | 20  | 60               | 130            | 7.51      | 223        | 7.8      | 40.00        | 1.83     |
|         |         |         | 14             | 20  | 60               | 190            | 7.50      | 227        | 7.6      | 40.20        | 1.92     |
|         |         |         | 15             | 20  | 60               | 250            | 7.49      | 231        | 7.9      | 40.10        | 1.86     |
|         |         | 1       | 11             | 10  | 0                | 0              | 7.63      | 216        | 8.4      | 39.80        | 1.90     |
|         |         |         | 12             | 20  | 70               | 70             | 7.28      | 220        | 9.3      | 40.40        | 1.90     |
|         |         |         | 13             | 20  | 60               | 130            | 7.06      | 224        | 9.6      | 40.40        | 1.96     |
|         |         |         | 14             | 20  | 60               | 190            | 6.88      | 228        | 12.4     | 40.80        | 1.91     |
|         |         |         | 15             | 20  | 60               | 250            | 6.68      | 232        | 11.4     | 41.10        | 1.81     |
|         |         | 2       | 11             | 10  | 0                | 0              | 7.36      | 217        | 9.8      | 39.10        | 1.71     |
|         |         |         | 12             | 20  | 70               | 70             | 6.58      | 221        | 10.9     | 37.90        | 1.78     |
|         |         |         | 13             | 20  | 60               | 130            | 6.77      | 225        | 12.6     | 37.30        | 1.67     |
|         |         |         | 14             | 20  | 60               | 190            | 6.63      | 229        | 14.3     | 35.90        | 1.68     |
|         |         |         | 15             | 20  | 60               | 250            | 6.50      | 233        | 13.5     | 35.30        | 1.65     |
|         |         | 3       | 11             | 10  | 0                | 0              | 7.41      | 218        | 9.0      | 40.10        | 1.85     |
|         |         |         | 12             | 20  | 70               | 70             | 7.04      | 222        | 10.1     | 39.80        | 1.84     |
|         |         |         | 13             | 20  | 60               | 130            | 6.86      | 226        | 10.4     | 39.90        | 1.94     |
|         |         |         | 14             | 20  | 60               | 190            | 6.75      | 230        | 11.1     | 40.30        | 1.91     |
|         |         |         | 15             | 20  | 60               | 250            | 6.57      | 234        | 11.0     | 40.10        | 1.79     |

MDPT OCTOBER 1994 continued

| Si(OH) <sub>4</sub><br>( $\mu$ M) | DOC<br>(mg/L) | TCO <sub>2</sub><br>( $\mu$ M) | DON<br>( $\mu$ g/L) | TDN<br>( $\mu$ g/L) | DOP<br>( $\mu$ g/L) | TDP<br>( $\mu$ g/L) | pH   | Fe<br>( $\mu$ M) | Mn<br>( $\mu$ M) |
|-----------------------------------|---------------|--------------------------------|---------------------|---------------------|---------------------|---------------------|------|------------------|------------------|
| 46.4                              | 3.63          | 1451.2                         | 24.6                | 72.2                | 0.20                | 2.04                | 7.46 | -0.36            | 0.66             |
| 46.6                              | 3.61          | HH                             | 22.1                | 69.9                | 0.15                | 2.02                | 7.45 | -0.36            | 0.62             |
| 47.6                              | 3.57          | 1472.8                         | 21.7                | 69.5                | 0.18                | 2.01                | 7.46 | -0.18            | 0.64             |
| 42.2                              | 3.64          | HH                             | 21.5                | 69.3                | 0.14                | 2.06                | 7.46 | -0.54            | 0.64             |
| 44.0                              | 3.58          | S                              | 23.1                | 71.1                | 0.16                | 2.02                | 7.45 | -0.36            | 0.62             |
| 46.3                              | 3.58          | 1468.4                         | 23.4                | 71.6                | 0.15                | 2.05                | 7.53 | -0.36            | 1.60             |
| 48.2                              | 3.67          | 1476.7                         | 24.5                | 74.2                | 0.19                | 2.09                | 7.49 | -0.36            | 2.20             |
| 48.4                              | 3.81          | 1496.4                         | 25.0                | 75.0                | 0.19                | 2.15                | 7.44 | -0.18            | 2.44             |
| 49.8                              | 3.62          | 1502.3                         | 22.6                | 75.8                | 0.22                | 2.13                | 7.41 | -0.36            | 2.58             |
| 50.1                              | 3.62          | S                              | 24.5                | 77.0                | 0.34                | 2.15                | 7.42 | -0.18            | 2.62             |
| 51.2                              | 3.55          | 1468.4                         | 21.9                | 70.8                | 0.31                | 2.02                | 7.53 | -0.18            | 1.97             |
| 56.8                              | 3.48          | 1509.9                         | 22.2                | 71.0                | 0.16                | 1.94                | 7.53 | -0.54            | 3.11             |
| 83.0                              | 3.42          | 1565.4                         | 28.4                | 78.3                | 0.31                | 1.98                | 7.50 | -0.36            | 3.80             |
| 88.3                              | 3.51          | 1612.7                         | 20.3                | 70.5                | 0.17                | 1.85                | 7.51 | -0.36            | 4.04             |
| 106.4                             | 3.36          | 1657.8                         | 19.1                | 67.9                | 0.14                | 1.79                | 7.52 | -0.36            | 4.17             |
| 47.4                              | 3.62          | 1462.3                         | 25.6                | 74.7                | 0.28                | 2.13                | 7.54 | -0.54            | 1.69             |
| 46.8                              | 3.62          | 1474.2                         | 28.6                | 78.5                | 0.39                | 2.23                | 7.51 | -0.54            | 2.09             |
| 49.0                              | 3.58          | 1495.4                         | 20.8                | 71.1                | 0.12                | 2.06                | 7.48 | -0.36            | 2.24             |
| 48.5                              | 3.63          | 1500.2                         | 20.2                | 71.6                | 0.20                | 2.11                | 7.47 | -0.54            | 2.33             |
| 50.5                              | 3.57          | 1517.9                         | 22.1                | 73.2                | 0.28                | 2.07                | 7.49 | -0.54            | 2.40             |

Numerical Water Quality and Contaminant Modeling (EL-22)

Tidal Fresh Potomac River and Maryland Mainstem

Core Data: Dissolved nutrient and oxygen concentrations in sediment - water flux chambers

| STATION | DATE    | CORE NO | TIME OF SAMPLE |     | TIME DELTA (min) | TIME SUM (min) | DO (mg/L) | AA VIAL NO | NH4 (µM) | NO2+NO3 (µM) | DIP (µM) |
|---------|---------|---------|----------------|-----|------------------|----------------|-----------|------------|----------|--------------|----------|
|         |         |         | hr             | min |                  |                |           |            |          |              |          |
| R-64    | 17OCT94 | B       | 16             | 15  | 0                | 0              | 7.39      | 128        | 5.4      | 1.91         | 0.15     |
|         |         |         | 17             | 15  | 60               | 60             | 7.39      | 132        | 4.8      | 2.14         | 0.18     |
|         |         |         | 18             | 15  | 60               | 120            | 7.45      | 136        | 4.9      | 1.92         | 0.14     |
|         |         |         | 19             | 15  | 60               | 180            | 7.44      | 140        | 4.8      | 1.94         | 0.17     |
|         |         |         | 20             | 15  | 60               | 240            | 7.44      | 144        | 4.9      | 2.11         | 0.16     |
|         |         | 1       | 16             | 15  | 0                | 0              | 6.94      | 129        | 8.6      | 1.95         | 0.27     |
|         |         |         | 17             | 15  | 60               | 60             | 6.65      | 133        | 11.0     | 1.91         | 0.28     |
|         |         |         | 18             | 15  | 60               | 120            | 6.33      | 137        | 13.3     | 1.82         | 0.28     |
|         |         |         | 19             | 15  | 60               | 180            | 6.03      | 141        | 15.0     | 1.79         | 0.29     |
|         |         |         | 20             | 15  | 60               | 240            | 5.76      | 145        | 17.0     | 1.75         | 0.36     |
|         |         | 2       | 16             | 15  | 0                | 0              | 6.84      | 130        | 8.2      | 1.89         | 0.39     |
|         |         |         | 17             | 15  | 60               | 60             | 6.52      | 134        | 10.5     | 1.86         | 0.40     |
|         |         |         | 18             | 15  | 60               | 120            | 6.21      | 138        | 13.2     | 1.84         | 0.47     |
|         |         |         | 19             | 15  | 60               | 180            | 5.97      | 142        | 14.9     | 1.82         | 0.58     |
|         |         |         | 20             | 15  | 60               | 240            | 5.79      | 146        | 16.7     | 1.80         | 0.67     |
|         |         | 3       | 16             | 15  | 0                | 0              | 6.92      | 131        | 11.8     | 1.85         | 1.04     |
|         |         |         | 17             | 15  | 60               | 60             | 6.38      | 135        | 14.9     | 1.80         | 1.07     |
|         |         |         | 18             | 15  | 60               | 120            | 5.89      | 139        | 17.3     | 1.75         | 1.13     |
|         |         |         | 19             | 15  | 60               | 180            | 5.54      | 143        | 19.9     | 1.70         | 1.17     |
|         |         |         | 20             | 15  | 60               | 240            | 5.21      | 147        | 21.0     | 1.61         | 1.24     |

R 64 OCTOBER 1994 continued

| Si(OH) <sub>4</sub><br>( $\mu$ M) | DOC<br>(mg/L) | TCO <sub>2</sub><br>( $\mu$ M) | DON<br>( $\mu$ g/L) | TDN<br>( $\mu$ g/L) | DOP<br>( $\mu$ g/L) | TDP<br>( $\mu$ g/L) | pH   | Fe<br>( $\mu$ M) | Mn<br>( $\mu$ M) |
|-----------------------------------|---------------|--------------------------------|---------------------|---------------------|---------------------|---------------------|------|------------------|------------------|
| 34.2                              | 2.26          | 1638.9                         | 23.9                | 31.2                | 0.23                | 0.38                | 7.73 | 2.15             | 1.11             |
| 35.4                              | 2.44          | 1646.8                         | 27.3                | 34.2                | 0.23                | 0.41                | 7.74 | 2.15             | 1.09             |
| 35.8                              | 2.27          |                                | 23.3                | 30.1                | 0.20                | 0.34                | 7.72 | 2.33             | 1.11             |
| 37.2                              | 2.30          | 1634.0                         | 21.1                | 27.8                | 0.20                | 0.37                | 7.75 | 2.33             | 1.11             |
| 39.1                              | 2.26          | 1644.8                         | 19.2                | 26.2                | 0.19                | 0.35                | 7.61 | 2.15             | 1.09             |
| 35.9                              | 2.32          | 1641.8                         | 24.0                | 34.5                | 0.21                | 0.48                | 7.85 | 2.69             | 1.15             |
| 38.2                              | 2.31          | 1679.6                         | 23.5                | 36.4                | 0.19                | 0.47                | 7.84 | 2.33             | 1.16             |
| 40.3                              | 2.32          | 1686.6                         | 23.1                | 38.2                | 0.19                | 0.47                | 7.78 | 2.15             | 1.16             |
| 41.8                              | 2.33          | 1718.1                         | 23.8                | 40.6                | 0.31                | 0.60                | 7.75 | 2.33             | 1.15             |
| 43.2                              | 2.30          | 1741.5                         | 22.5                | 41.2                | 0.15                | 0.51                | 7.69 | 2.15             | 1.15             |
| 35.7                              | 2.28          | 1635.7                         | 22.6                | 32.7                | 0.18                | 0.57                | 7.88 | 2.15             | 1.15             |
| 38.8                              | 2.27          | 1679.7                         | 22.7                | 35.1                | 0.19                | 0.59                | 7.89 | 2.51             | 1.20             |
| 41.2                              | 2.33          | 1701.3                         | 23.4                | 38.4                | 0.17                | 0.64                | 7.79 | 2.51             | 1.16             |
| 43.3                              | 2.26          | 1725.4                         | 21.5                | 38.2                | 0.18                | 0.76                | 7.78 | 2.33             | 1.22             |
| 45.1                              | 2.33          | 1738.3                         | 20.9                | 39.4                | 0.14                | 0.81                | 7.74 | 2.51             | 1.22             |
| 37.7                              | 2.37          | 1689.6                         | 27.5                | 41.1                | 0.17                | 1.21                | 7.87 | 2.69             | 1.38             |
| 40.4                              | 2.32          | 1732.7                         | 23.7                | 40.4                | 0.20                | 1.27                | 7.89 | 2.33             | 1.37             |
| 42.2                              | 2.31          | 1745.4                         | 26.6                | 45.6                | 0.19                | 1.32                | 7.74 | 2.33             | 1.35             |
| 43.6                              | 2.37          | 1756.4                         | 23.8                | 45.4                | 0.23                | 1.40                | 7.76 | 2.15             | 1.35             |
| 45.6                              | 2.31          | 1779.4                         | 22.6                | 45.2                | 0.19                | 1.43                | 7.74 | 2.33             | 1.38             |

Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Sulfate Data: Sulfate concentration in sediment pore water

| STATION | MONTH | TIME<br>DAYS | REPLICATE<br>NUMBER* | SO4<br>( $\mu$ M) | SO4<br>(mg/L) |
|---------|-------|--------------|----------------------|-------------------|---------------|
| HGNK    | MAY   | 0            | 1:1                  | 31.95             | 3.07          |
| HGNK    | MAY   | 0            | 1:2                  | 50.93             | 4.89          |
| HGNK    | MAY   | 0            | 1:3                  | 51.79             | 4.97          |
| HGNK    | MAY   | 2            | 2:1                  | 9.49              | 0.91          |
| HGNK    | MAY   | 2            | 2:2                  | 9.82              | 0.94          |
| HGNK    | MAY   | 2            | 2:3                  | 12.64             | 1.21          |
| HGNK    | MAY   | 4            | 3:1                  | 5.44              | 0.52          |
| HGNK    | MAY   | 4            | 3:2                  | 5.32              | 0.51          |
| HGNK    | MAY   | 4            | 3:3                  | 5.23              | 0.50          |
| HGNK    | MAY   | 6            | 4:1                  | 8.42              | 0.81          |
| HGNK    | MAY   | 6            | 4:2                  | 6.06              | 0.58          |
| HGNK    | MAY   | 6            | 4:3                  | 4.39              | 0.42          |
|         |       |              |                      |                   |               |
| GNVC    | MAY   | 0            | 1:1                  | 31.80             | 3.05          |
| GNVC    | MAY   | 0            | 1:2                  | 34.82             | 3.34          |
| GNVC    | MAY   | 0            | 1:3                  | 35.82             | 3.44          |
| GNVC    | MAY   | 2            | 2:1                  | 10.29             | 0.99          |
| GNVC    | MAY   | 2            | 2:2                  | 9.24              | 0.89          |
| GNVC    | MAY   | 2            | 2:3                  | 10.33             | 0.99          |
| GNVC    | MAY   | 4            | 3:1                  | 3.51              | 0.34          |
| GNVC    | MAY   | 4            | 3:2                  | S                 | S             |
| GNVC    | MAY   | 4            | 3:3                  | 5.27              | 0.51          |
| GNVC    | MAY   | 6            | 4:1                  | 5.37              | 0.52          |
| GNVC    | MAY   | 6            | 4:2                  | 7.11              | 0.68          |
| GNVC    | MAY   | 6            | 4:3                  | 6.92              | 0.66          |
|         |       |              |                      |                   |               |
| MDPT    | MAY   | 0            | 1:1                  | 257.30            | 24.70         |
| MDPT    | MAY   | 0            | 1:2                  | 303.76            | 29.16         |
| MDPT    | MAY   | 0            | 1:3                  | 254.14            | 24.40         |
| MDPT    | MAY   | 2            | 2:1                  | 67.34             | 6.46          |
| MDPT    | MAY   | 2            | 2:2                  | 31.72             | 3.04          |
| MDPT    | MAY   | 2            | 2:3                  | 27.14             | 2.61          |
| MDPT    | MAY   | 4            | 3:1                  | 5.41              | 0.52          |
| MDPT    | MAY   | 4            | 3:2                  | 6.40              | 0.61          |
| MDPT    | MAY   | 4            | 3:3                  | 6.33              | 0.61          |
| MDPT    | MAY   | 6            | 4:1                  | 6.73              | 0.65          |
| MDPT    | MAY   | 6            | 4:2                  | S                 | S             |
| MDPT    | MAY   | 6            | 4:3                  | 8.40              | 0.81          |
|         |       |              |                      |                   |               |
| R 64    | MAY   | 0            | 1:1                  | 7737.05           | 742.76        |
| R 64    | MAY   | 0            | 1:2                  | 6020.26           | 577.94        |
| R 64    | MAY   | 0            | 1:3                  | 7946.50           | 762.86        |
| R 64    | MAY   | 2            | 2:1                  | 7596.75           | 729.29        |
| R 64    | MAY   | 2            | 2:2                  | 6405.87           | 614.96        |
| R 64    | MAY   | 2            | 2:3                  | 6996.70           | 671.68        |
| R 64    | MAY   | 4            | 3:1                  | 8896.74           | 854.09        |
| R 64    | MAY   | 4            | 3:2                  | 4266.83           | 409.62        |
| R 64    | MAY   | 4            | 3:3                  | 5641.48           | 541.58        |
| R 64    | MAY   | 6            | 4:1                  | 6645.33           | 637.95        |
| R 64    | MAY   | 6            | 4:2                  | 5138.13           | 493.26        |
| R 64    | MAY   | 6            | 4:3                  | 2676.10           | 256.91        |

\*Note: Replicate number denotes time point and replicate ( 2:1 is the first replicate of the second time point).

Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Sulfate Data: Sulfate concentration in sediment pore water

| STATION | MONTH | TIME<br>DAYS | REPLICATE<br>NUMBER* | SO <sub>4</sub><br>(μM) | SO <sub>4</sub><br>(mg/L) |
|---------|-------|--------------|----------------------|-------------------------|---------------------------|
| HGNK    | JULY  | 0            | 1:1                  | 25.81                   | 2.48                      |
| HGNK    | JULY  | 0            | 1:2                  | 20.70                   | 1.99                      |
| HGNK    | JULY  | 0            | 1:3                  | S                       | S                         |
| HGNK    | JULY  | 2            | 2:1                  | 24.03                   | 2.31                      |
| HGNK    | JULY  | 2            | 2:2                  | 18.51                   | 1.78                      |
| HGNK    | JULY  | 2            | 2:3                  | 17.35                   | 1.67                      |
| HGNK    | JULY  | 4            | 3:1                  | 24.93                   | 2.39                      |
| HGNK    | JULY  | 4            | 3:2                  | 20.46                   | 1.96                      |
| HGNK    | JULY  | 4            | 3:3                  | 24.74                   | 2.38                      |
| HGNK    | JULY  | 6            | 4:1                  | 23.05                   | 2.21                      |
| HGNK    | JULY  | 6            | 4:2                  | 31.35                   | 3.01                      |
| HGNK    | JULY  | 6            | 4:3                  | 25.24                   | 2.42                      |
|         |       |              |                      |                         |                           |
| GNVC    | JULY  | 0            | 1:1                  | 65.93                   | 6.33                      |
| GNVC    | JULY  | 0            | 1:2                  | S                       | S                         |
| GNVC    | JULY  | 0            | 1:3                  | 73.44                   | 7.05                      |
| GNVC    | JULY  | 2            | 2:1                  | 17.15                   | 1.65                      |
| GNVC    | JULY  | 2            | 2:2                  | 21.95                   | 2.11                      |
| GNVC    | JULY  | 2            | 2:3                  | 21.63                   | 2.08                      |
| GNVC    | JULY  | 4            | 3:1                  | 16.35                   | 1.57                      |
| GNVC    | JULY  | 4            | 3:2                  | 17.73                   | 1.70                      |
| GNVC    | JULY  | 4            | 3:3                  | 15.92                   | 1.53                      |
| GNVC    | JULY  | 6            | 4:1                  | 21.93                   | 2.11                      |
| GNVC    | JULY  | 6            | 4:2                  | 16.45                   | 1.58                      |
| GNVC    | JULY  | 6            | 4:3                  | 17.30                   | 1.66                      |
|         |       |              |                      |                         |                           |
| MDPT    | JULY  | 0            | 1:1                  | 1296.66                 | 124.48                    |
| MDPT    | JULY  | 0            | 1:2                  | 1243.72                 | 119.40                    |
| MDPT    | JULY  | 0            | 1:3                  | 1463.14                 | 140.46                    |
| MDPT    | JULY  | 2            | 2:1                  | 848.44                  | 81.45                     |
| MDPT    | JULY  | 2            | 2:2                  | 703.65                  | 67.55                     |
| MDPT    | JULY  | 2            | 2:3                  | 720.67                  | 69.18                     |
| MDPT    | JULY  | 4            | 3:1                  | 251.75                  | 24.17                     |
| MDPT    | JULY  | 4            | 3:2                  | 676.84                  | 64.98                     |
| MDPT    | JULY  | 4            | 3:3                  | 1063.89                 | 102.13                    |
| MDPT    | JULY  | 6            | 4:1                  | 22.27                   | 2.14                      |
| MDPT    | JULY  | 6            | 4:2                  | 22.11                   | 2.12                      |
| MDPT    | JULY  | 6            | 4:3                  | 397.74                  | 38.18                     |
|         |       |              |                      |                         |                           |
| R 64    | JULY  | 0            | 1:1                  | 6734.80                 | 646.54                    |
| R 64    | JULY  | 0            | 1:2                  | 6332.51                 | 607.92                    |
| R 64    | JULY  | 0            | 1:3                  | 5793.16                 | 556.14                    |
| R 64    | JULY  | 2            | 2:1                  | 2810.01                 | 269.76                    |
| R 64    | JULY  | 2            | 2:2                  | 3679.74                 | 353.26                    |
| R 64    | JULY  | 2            | 2:3                  | 2606.45                 | 250.22                    |
| R 64    | JULY  | 4            | 3:1                  | 1143.99                 | 109.82                    |
| R 64    | JULY  | 4            | 3:2                  | 1481.78                 | 142.25                    |
| R 64    | JULY  | 4            | 3:3                  | 770.91                  | 74.01                     |
| R 64    | JULY  | 6            | 4:1                  | 188.38                  | 18.08                     |
| R 64    | JULY  | 6            | 4:2                  | 226.82                  | 21.77                     |
| R 64    | JULY  | 6            | 4:3                  | 296.62                  | 28.48                     |

\*Note: Replicate number denotes time point and replicate ( 2:1 is the first replicate of the second time point).

Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Sulfate Data: Sulfate concentration in sediment pore water

| STATION | MONTH  | TIME<br>DAYS | REPLICATE<br>NUMBER* | SO4<br>( $\mu$ M) | SO4<br>(mg/L) |
|---------|--------|--------------|----------------------|-------------------|---------------|
| HGNK    | AUGUST | 0            | 1:1                  | 105.62            | 10.14         |
| HGNK    | AUGUST | 0            | 1:2                  | 99.19             | 9.52          |
| HGNK    | AUGUST | 0            | 1:3                  | 97.78             | 9.39          |
| HGNK    | AUGUST | 2            | 2:1                  | 91.73             | 8.81          |
| HGNK    | AUGUST | 2            | 2:2                  | 83.27             | 7.99          |
| HGNK    | AUGUST | 2            | 2:3                  | 91.64             | 8.80          |
| HGNK    | AUGUST | 4            | 3:1                  | S                 | S             |
| HGNK    | AUGUST | 4            | 3:2                  | 86.85             | 8.34          |
| HGNK    | AUGUST | 4            | 3:3                  | 90.26             | 8.66          |
| HGNK    | AUGUST | 6            | 4:1                  | 81.75             | 7.85          |
| HGNK    | AUGUST | 6            | 4:2                  | 92.57             | 8.89          |
| HGNK    | AUGUST | 6            | 4:3                  | 94.16             | 9.04          |
|         |        |              |                      |                   |               |
| GNVC    | AUGUST | 0            | 1:1                  | 131.37            | 12.61         |
| GNVC    | AUGUST | 0            | 1:2                  | 128.33            | 12.32         |
| GNVC    | AUGUST | 0            | 1:3                  | 137.23            | 13.17         |
| GNVC    | AUGUST | 2            | 2:1                  | 89.94             | 8.63          |
| GNVC    | AUGUST | 2            | 2:2                  | 93.45             | 8.97          |
| GNVC    | AUGUST | 2            | 2:3                  | 94.06             | 9.03          |
| GNVC    | AUGUST | 4            | 3:1                  | 97.82             | 9.39          |
| GNVC    | AUGUST | 4            | 3:2                  | 94.50             | 9.07          |
| GNVC    | AUGUST | 4            | 3:3                  | 96.65             | 9.28          |
| GNVC    | AUGUST | 6            | 4:1                  | 92.29             | 8.86          |
| GNVC    | AUGUST | 6            | 4:2                  | 95.62             | 9.18          |
| GNVC    | AUGUST | 6            | 4:3                  | 89.70             | 8.61          |
|         |        |              |                      |                   |               |
| MDPT    | AUGUST | 0            | 1:1                  | 1603.00           | 153.89        |
| MDPT    | AUGUST | 0            | 1:2                  | 1930.89           | 185.37        |
| MDPT    | AUGUST | 0            | 1:3                  | 1885.96           | 181.05        |
| MDPT    | AUGUST | 2            | 2:1                  | 1194.36           | 114.66        |
| MDPT    | AUGUST | 2            | 2:2                  | 1269.88           | 121.91        |
| MDPT    | AUGUST | 2            | 2:3                  | 1819.62           | 174.68        |
| MDPT    | AUGUST | 4            | 3:1                  | 856.11            | 82.19         |
| MDPT    | AUGUST | 4            | 3:2                  | 1159.09           | 111.27        |
| MDPT    | AUGUST | 4            | 3:3                  | 1356.02           | 130.18        |
| MDPT    | AUGUST | 6            | 4:1                  | 1060.91           | 101.85        |
| MDPT    | AUGUST | 6            | 4:2                  | 1698.10           | 163.02        |
| MDPT    | AUGUST | 6            | 4:3                  | 169.06            | 16.23         |
|         |        |              |                      |                   |               |
| R 64    | AUGUST | 0            | 1:1                  | 7927.16           | 761.01        |
| R 64    | AUGUST | 0            | 1:2                  | 8090.11           | 776.65        |
| R 64    | AUGUST | 0            | 1:3                  | 7735.00           | 742.56        |
| R 64    | AUGUST | 2            | 2:1                  | 5765.94           | 553.53        |
| R 64    | AUGUST | 2            | 2:2                  | 6192.51           | 594.48        |
| R 64    | AUGUST | 2            | 2:3                  | 5860.96           | 562.65        |
| R 64    | AUGUST | 4            | 3:1                  | 4937.80           | 474.03        |
| R 64    | AUGUST | 4            | 3:2                  | 3540.61           | 339.90        |
| R 64    | AUGUST | 4            | 3:3                  | 3322.79           | 318.99        |
| R 64    | AUGUST | 6            | 4:1                  | 2752.21           | 264.21        |
| R 64    | AUGUST | 6            | 4:2                  | 2970.90           | 285.21        |
| R 64    | AUGUST | 6            | 4:3                  | 3005.65           | 288.54        |

\*Note: Replicate number denotes time point and replicate ( 2:1 is the first replicate of the second time point).

Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Sulfate Data: Sulfate concentration in sediment pore water

| STATION | MONTH   | TIME<br>DAYS | REPLICATE<br>NUMBER* | SO4<br>( $\mu$ M) | SO4<br>(mg/L) |
|---------|---------|--------------|----------------------|-------------------|---------------|
| HGNK    | OCTOBER | 0            | 1:1                  | 75.50             | 7.25          |
| HGNK    | OCTOBER | 0            | 1:2                  | 57.11             | 5.48          |
| HGNK    | OCTOBER | 0            | 1:3                  | 59.55             | 5.72          |
| HGNK    | OCTOBER | 2            | 2:1                  | 26.76             | 2.57          |
| HGNK    | OCTOBER | 2            | 2:2                  | 24.03             | 2.31          |
| HGNK    | OCTOBER | 2            | 2:3                  | 21.22             | 2.04          |
| HGNK    | OCTOBER | 4            | 3:1                  | 26.58             | 2.55          |
| HGNK    | OCTOBER | 4            | 3:2                  | 16.45             | 1.58          |
| HGNK    | OCTOBER | 4            | 3:3                  | 15.69             | 1.51          |
| HGNK    | OCTOBER | 6            | 4:1                  | 18.66             | 1.79          |
| HGNK    | OCTOBER | 6            | 4:2                  | 18.26             | 1.75          |
| HGNK    | OCTOBER | 6            | 4:3                  | 16.81             | 1.61          |
|         |         |              |                      |                   |               |
| GNVC    | OCTOBER | 0            | 1:1                  | 59.51             | 5.71          |
| GNVC    | OCTOBER | 0            | 1:2                  | 41.51             | 3.98          |
| GNVC    | OCTOBER | 0            | 1:3                  | 72.95             | 7.00          |
| GNVC    | OCTOBER | 2            | 2:1                  | 28.58             | 2.74          |
| GNVC    | OCTOBER | 2            | 2:2                  | 42.62             | 4.09          |
| GNVC    | OCTOBER | 2            | 2:3                  | 65.41             | 6.28          |
| GNVC    | OCTOBER | 4            | 3:1                  | 21.12             | 2.03          |
| GNVC    | OCTOBER | 4            | 3:2                  | 45.02             | 4.32          |
| GNVC    | OCTOBER | 4            | 3:3                  | 20.77             | 1.99          |
| GNVC    | OCTOBER | 6            | 4:1                  | 23.16             | 2.22          |
| GNVC    | OCTOBER | 6            | 4:2                  | 30.01             | 2.88          |
| GNVC    | OCTOBER | 6            | 4:3                  | 41.65             | 4.00          |
|         |         |              |                      |                   |               |
| MDPT    | OCTOBER | 0            | 1:1                  | 3265.59           | 313.50        |
| MDPT    | OCTOBER | 0            | 1:2                  | 2766.76           | 265.61        |
| MDPT    | OCTOBER | 0            | 1:3                  | 3281.43           | 315.02        |
| MDPT    | OCTOBER | 2            | 2:1                  | 3657.00           | 351.07        |
| MDPT    | OCTOBER | 2            | 2:2                  | 1744.53           | 167.48        |
| MDPT    | OCTOBER | 2            | 2:3                  | 3311.57           | 317.91        |
| MDPT    | OCTOBER | 4            | 3:1                  | 1994.45           | 191.47        |
| MDPT    | OCTOBER | 4            | 3:2                  | 2736.26           | 262.68        |
| MDPT    | OCTOBER | 4            | 3:3                  | 3494.82           | 335.50        |
| MDPT    | OCTOBER | 6            | 4:1                  | 3014.48           | 289.39        |
| MDPT    | OCTOBER | 6            | 4:2                  | 2679.15           | 257.20        |
| MDPT    | OCTOBER | 6            | 4:3                  | 1830.66           | 175.74        |
|         |         |              |                      |                   |               |
| R 64    | OCTOBER | 0            | 1:1                  | 6247.23           | 599.73        |
| R 64    | OCTOBER | 0            | 1:2                  | 5566.24           | 534.36        |
| R 64    | OCTOBER | 0            | 1:3                  | 5712.76           | 548.43        |
| R 64    | OCTOBER | 2            | 2:1                  | 3227.08           | 309.80        |
| R 64    | OCTOBER | 2            | 2:2                  | 3270.83           | 314.00        |
| R 64    | OCTOBER | 2            | 2:3                  | 3455.21           | 331.70        |
| R 64    | OCTOBER | 4            | 3:1                  | 1579.03           | 151.59        |
| R 64    | OCTOBER | 4            | 3:2                  | 1910.44           | 183.40        |
| R 64    | OCTOBER | 4            | 3:3                  | 1892.90           | 181.72        |
| R 64    | OCTOBER | 6            | 4:1                  | 439.38            | 42.18         |
| R 64    | OCTOBER | 6            | 4:2                  | 707.15            | 67.89         |
| R 64    | OCTOBER | 6            | 4:3                  | 780.88            | 74.96         |

\*Note: Replicate number denotes time point and replicate ( 2:1 is the first replicate of the second time point).

# **Appendix E**

## **Sediment-Water Oxygen and Nutrient Flux Data Tables**

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Numerical Water Quality and Contaminant Modeling (EL-22)

Tidal Fresh Potomac River and Maryland Mainstem

Sediment-Water Flux: Net sediment-water exchanges of dissolved oxygen and nutrients

| STATION | DATE    | CORE<br>NO | CORE<br>H2O<br>VOL<br>(mL) | CORE<br>DEPTH<br>(m) | DO<br>SLOPE<br>[mg/(L.min)] | DO<br>FLUX<br>[gO2/(m2.day)] | NUMBER<br>OF<br>CORES | DO<br>FLUX<br>MEAN | DO<br>STANDARD<br>DEVIATION |
|---------|---------|------------|----------------------------|----------------------|-----------------------------|------------------------------|-----------------------|--------------------|-----------------------------|
| HGNK    | 19MAY94 | 1          | 2040                       | 0.147                | -0.008009                   | -1.61                        | 3                     | -1.60              | 0.15                        |
|         |         | 2          | 1940                       | 0.140                | -0.009082                   | -1.74                        |                       |                    |                             |
|         |         | 3          | 1920                       | 0.138                | -0.007703                   | -1.45                        |                       |                    |                             |
| GNCV    | 19MAY94 | 1          | 1980                       | 0.142                | -0.008757                   | -1.66                        | 3                     | -1.55              | 0.12                        |
|         |         | 2          | 1720                       | 0.124                | -0.009387                   | -1.55                        |                       |                    |                             |
|         |         | 3          | 2160                       | 0.155                | -0.007057                   | -1.43                        |                       |                    |                             |
| MDPT    | 20MAY94 | 1          | 2220                       | 0.160                | -0.005485                   | -1.26                        | 3                     | -1.50              | 0.22                        |
|         |         | 2          | 1700                       | 0.122                | -0.009658                   | -1.70                        |                       |                    |                             |
|         |         | 3          | 1840                       | 0.132                | -0.008049                   | -1.53                        |                       |                    |                             |
| R 64    | 21MAY94 | 1          | 1550                       | 0.112                | -0.004316                   | -0.69                        | 3                     | -0.72              | 0.03                        |
|         |         | 2          | 1520                       | 0.109                | -0.004733                   | -0.75                        |                       |                    |                             |
|         |         | 3          | 1560                       | 0.112                | -0.004520                   | -0.73                        |                       |                    |                             |

MAY 1994 FLUX continued

| STATION | CORE<br>NO | NH4<br>SLOPE                                   | NH4<br>FLUX                                     | NUMBER<br>OF<br>CORES | NH4<br>FLUX<br>MEAN | NH4<br>STANDARD<br>DEVIATION |
|---------|------------|--|---|-----------------------|---------------------|------------------------------|
|         |            | [ $\mu\text{MN}/(\text{L} \cdot \text{min})$ ] | [ $\mu\text{MN}/(\text{m}^2 \cdot \text{hr})$ ] |                       |                     |                              |
| HGNK    | 1          | 0.084647                                       | 791.8   | 3                     | 512.1               | 253.3                        |
|         | 2          | 0.048007                                       | 446.1   |                       |                     |                              |
|         | 3          | 0.030719                                       | 298.3   |                       |                     |                              |
| GNCV    | 1          | 0.032397                                       | 276.9   | 3                     | 281.3               | 32.5                         |
|         | 2          | 0.042533                                       | 315.8   |                       |                     |                              |
|         | 3          | 0.026957                                       | 251.3   |                       |                     |                              |
| MDPT    | 1          | 0.008871                                       | 85.0  | 3                     | 96.8                | 13.0                         |
|         | 2          | 0.015088                                       | 110.7   |                       |                     |                              |
|         | 3          | 0.011926                                       | 94.7  |                       |                     |                              |
| R 64    | 1          | 0.034137                                       | 228.4   | 3                     | 181.7               | 41.9                         |
|         | 2          | 0.025822                                       | 169.4   |                       |                     |                              |
|         | 3          | 0.021890                                       | 147.4   |                       |                     |                              |

MAY 1994 FLUX continued

| STATION | CORE<br>NO | pH<br>SLOPE      | pH<br>FLUX      | NUMBER<br>OF<br>CORES | pH<br>FLUX<br>MEAN | pH<br>STANDARD<br>DEVIATION |
|---------|------------|------------------|-----------------|-----------------------|--------------------|-----------------------------|
|         |            | [-log H/(L.min)] | [-logH/(m2.hr)] |                       |                    |                             |
| HGNK    | 1          | -0.000789        | -6.9            | 2                     | -6.0               | 0.0001                      |
|         | 2          | -0.000598        | -5.0            |                       |                    |                             |
|         | 3          | NI               | NI              |                       |                    |                             |
| GNCV    | 1          | -0.0005784       | -4.9            | 3                     | -5.6               | 0.5983                      |
|         | 2          | -0.0007895       | -5.9            |                       |                    |                             |
|         | 3          | -0.0006507       | -6.1            |                       |                    |                             |
| MDPT    | 1          | -0.00055318      | -5.3            | 3                     | -5.9               | 0.7491                      |
|         | 2          | -0.00091644      | -6.7            |                       |                    |                             |
|         | 3          | -0.00070627      | -5.6            |                       |                    |                             |
| R 64    | 1          | -0.00050575      | -3.4            | 2                     | -3.1               | 0.4481                      |
|         | 2          | NI               | NI              |                       |                    |                             |
|         | 3          | -0.00040839      | -2.8            |                       |                    |                             |

MAY 1994 FLUX continued

| STATION | CORE<br>NO | NO <sub>2</sub> + NO <sub>3</sub><br>SLOPE     | NO <sub>2</sub> + NO <sub>3</sub><br>FLUX       | NUMBER<br>OF<br>CORES | NO <sub>2</sub> + NO <sub>3</sub><br>FLUX<br>MEAN | NO <sub>2</sub> + NO <sub>3</sub><br>STANDARD<br>DEVIATION |
|---------|------------|--|---|-----------------------|---|--|
|         |            | [ $\mu\text{MN}/(\text{L} \cdot \text{min})$ ] | [ $\mu\text{MN}/(\text{m}^2 \cdot \text{hr})$ ] |                       |   |  |
| HGNK    | 1          | -0.02493                                       | -219.53   | 3                     | -318.64   | 145.689  |
|         | 2          | -0.02991                                       | -250.47   |                       |   |  |
|         | 3          | -0.05863                                       | -485.91   |                       |   |  |
| GNCV    | 1          | -0.021644                                      | -184.99   | 3                     | -167.22   | 16.342   |
|         | 2          | -0.020585                                      | -152.83   |                       |   |  |
|         | 3          | -0.017571                                      | -163.83   |                       |   |  |
| MDPT    | 1          | -0.016738                                      | -181.69   | 3                     | -257.74   | 68.452   |
|         | 2          | -0.035538                                      | -277.09   |                       |   |  |
|         | 3          | -0.037366                                      | -314.43   |                       |   |  |
| R 64    | 1          | -0.011243                                      | -75.22  | 3                     | -83.95  | 9.667  |
|         | 2          | -0.012542                                      | -82.29  |                       |   |  |
|         | 3          | -0.01401                                       | -94.34  |                       |   |  |

MAY 1994 FLUX continued

| STATION | CORE<br>NO | DIP<br>SLOPE                             | DIP<br>FLUX                               | NUMBER<br>OF<br>CORES | DIP<br>FLUX<br>MEAN | DIP<br>STANDARD<br>DEVIATION |
|---------|------------|--|---|-----------------------|---------------------|------------------------------|
|         |            | [ $\mu\text{MP}/(\text{L}.\text{min})$ ] | [ $\mu\text{MP}/(\text{m}^2.\text{hr})$ ] |                       |                     |                              |
| HGK     | 1          | 0.000000                                 | 0.00                                      | 3                     | 1.10                | 1.91                         |
|         | 2          | 0.000395                                 | 3.31                                      |                       |                     |                              |
|         | 3          | 0.000000                                 | 0.00                                      |                       |                     |                              |
| GNCV    | 1          | 0.000000                                 | 0.00                                      | 3                     | 0.00                | 0.00                         |
|         | 2          | 0.000000                                 | 0.00                                      |                       |                     |                              |
|         | 3          | 0.000000                                 | 0.00                                      |                       |                     |                              |
| MDPT    | 1          | NI                                       | NI  | 2                     | 4.19                | 0.26                         |
|         | 2          | 0.000546                                 | 4.01                                      |                       |                     |                              |
|         | 3          | 0.000550                                 | 4.37                                      |                       |                     |                              |
| R 64    | 1          | 0.000690                                 | 4.62                                      | 3                     | 4.05                | 0.70                         |
|         | 2          | 0.000498                                 | 3.27                                      |                       |                     |                              |
|         | 3          | 0.000633                                 | 4.26                                      |                       |                     |                              |

MAY 1994 FLUX continued

| STATION | CORE<br>NO | SILICATE<br>SLOPE                         | SILICATE<br>FLUX                           | NUMBER<br>OF<br>CORES | SILICATE<br>FLUX<br>MEAN | SILICATE<br>STANDARD<br>DEVIATION |
|---------|------------|---|--|-----------------------|--------------------------|-----------------------------------|
|         |            | [ $\mu\text{MSi}/(\text{L}.\text{min})$ ] | [ $\mu\text{MSi}/(\text{m}^2.\text{hr})$ ] |                       |                          |                                   |
| HGNK    | 1          | 0.07345                                   | 647  | 3                     | 1040                     | 661                               |
|         | 2          | 0.079978                                  | 670  |                       |                          |                                   |
|         | 3          | 0.2175                                    | 1803                                       |                       |                          |                                   |
| GNCV    | 1          | 0.036147                                  | 196  | 2                     | 99                       | 137                               |
|         | 2          | NI  | NI   |                       |                          |                                   |
|         | 3          | 0.013475                                  | 2  |                       |                          |                                   |
| MDPT    | 1          | 0.057379                                  | 550  | 3                     | 309                      | 214                               |
|         | 2          | 0.019124                                  | 140  |                       |                          |                                   |
|         | 3          | 0.029853                                  | 237  |                       |                          |                                   |
| R 64    | 1          | 0.041092                                  | 275  | 3                     | 271                      | 14                                |
|         | 2          | 0.038978                                  | 256  |                       |                          |                                   |
|         | 3          | 0.042065                                  | 283  |                       |                          |                                   |

MAY 1994 FLUX continued

| STATION | CORE<br>NO | TCO2   | TCO2   | NUMBER<br>OF<br>CORES | TCO2<br>FLUX<br>MEAN | TCO2<br>STANDARD<br>DEVIATION |
|---------|------------|--|--|-----------------------|----------------------|-------------------------------|
|         |            | SLOPE<br>[ $\mu\text{MCO}_2/(\text{L} \cdot \text{min})$ ] | FLUX<br>[ $\mu\text{MCO}_2/(\text{m}^2 \cdot \text{hr})$ ] |                       |                      |                               |
| HGNK    | 1          | 0.985  | 8924   | 2                     | 9617                 | 978.84                        |
|         | 2          | NI   | NI   |                       |                      |                               |
|         | 3          | 1.215  | 10309  |                       |                      |                               |
| GNCV    | 1          | 0.958  | 7863   | 3                     | 6018                 | 2217.22                       |
|         | 2          | 0.931  | 6631   |                       |                      |                               |
|         | 3          | 0.419  | 3558   |                       |                      |                               |
| MDPT    | 1          | 0.182  | 1647   | 3                     | 1404                 | 299.62                        |
|         | 2          | 0.156  | 1070   |                       |                      |                               |
|         | 3          | 0.198  | 1497   |                       |                      |                               |
| R 64    | 1          | 0.317  | 2123   | 3                     | 1735                 | 342.49                        |
|         | 2          | 0.225  | 1475   |                       |                      |                               |
|         | 3          | 0.238  | 1606   |                       |                      |                               |

MAY 1994 FLUX continued

| STATION | CORE<br>NO | DOC<br>SLOPE<br>[mg/(L.min)] | DOC<br>FLUX<br>[gDOC/(m2.day)] | NUMBER<br>OF<br>CORES | DOC<br>FLUX<br>MEAN | DOC<br>STANDARD<br>DEVIATION |
|---------|------------|------------------------------|--------------------------------|-----------------------|---------------------|------------------------------|
| HGNK    | 1          | 0.000000                     | 0.00                           | 3                     | 0.00                | 0.00                         |
|         | 2          | 0.000000                     | 0.00                           |                       |                     |                              |
|         | 3          | 0.000000                     | 0.00                           |                       |                     |                              |
| GNCV    | 1          | 0.002380                     | 8.35                           | 3                     | 10.37               | 2.43                         |
|         | 2          | 0.002708                     | 9.68                           |                       |                     |                              |
|         | 3          | 0.002805                     | 13.07                          |                       |                     |                              |
| MDPT    | 1          | 0.000000                     | 0.00                           | 3                     | 0.00                | 0.00                         |
|         | 2          | 0.000000                     | 0.00                           |                       |                     |                              |
|         | 3          | 0.000000                     | 0.00                           |                       |                     |                              |
| R 64    | 1          | 0.000000                     | 0.00                           | 3                     | 0.00                | 0.00                         |
|         | 2          | 0.000000                     | 0.00                           |                       |                     |                              |
|         | 3          | 0.000000                     | 0.00                           |                       |                     |                              |

MAY 1994 FLUX continued

| STATION | CORE | DON           | DON           | NUMBER | DON   | DON       |
|---------|------|---------------|---------------|--------|-------|-----------|
|         | NO   | SLOPE         | FLUX          | OF     | FLUX  | STANDARD  |
|         |      |               |               | CORES  | MEAN  | DEVIATION |
|         |      | [μMN/(L.min)] | [μMN/(m2.hr)] |        |       |           |
| HGNK    | 1    | NI            | NI            | 0      | NI    |           |
|         | 2    | NI            | NI            |        |       |           |
|         | 3    | NI            | NI            |        |       |           |
| GNCV    | 1    | NI            | NI            | 0      | NI    |           |
|         | 2    | NI            | NI            |        |       |           |
|         | 3    | NI            | NI            |        |       |           |
| MDPT    | 1    | 0.01578       | 151.2         | 1      | 151.2 | 0         |
|         | 2    | NI            | NI            |        |       |           |
|         | 3    | NI            | NI            |        |       |           |
| R 64    | 1    | NI            | NI            | 0      | NI    |           |
|         | 2    | NI            | NI            |        |       |           |
|         | 3    | NI            | NI            |        |       |           |

MAY 1994 FLUX continued

| STATION                    | CORE | DOP         | DOP   | NUMBER | DOP   | DOP  |
|----------------------------|------|-------------|-------|--------|-------|------|
|                            | NO   | SLOPE       | FLUX  |        | OF    | FLUX |
| [μMP/(L.min)][μMP/(m2.hr)] |      |             |       |        |       |      |
| HGK                        | 1    | 0           | 0.00  | 3      | 0.00  | 0.00 |
|                            | 2    | 0           | 0.00  |        |       |      |
|                            | 3    | 0           | 0.00  |        |       |      |
| GNCV                       | 1    | -0.00022086 | -1.89 | 2      | -2.33 | 0.63 |
|                            | 2    | NI          | NI    |        |       |      |
|                            | 3    | -0.00029762 | -2.77 |        |       |      |
| MDPT                       | 1    | NI          | NI    | 2      | -0.78 | 4.37 |
|                            | 2    | -0.0005275  | -3.87 |        |       |      |
|                            | 3    | 0.0002907   | 2.31  |        |       |      |
| R 64                       | 1    | 0.00053     | 0.57  | 3      | -0.82 | 1.85 |
|                            | 2    | 0           | -2.92 |        |       |      |
|                            | 3    | 0.00042667  | -0.12 |        |       |      |

MAY 1994 FLUX continued

| STATION | CORE | Fe<br>SLOPE                  | Fe<br>FLUX | NUMBER<br>OF<br>CORES | Fe<br>FLUX<br>MEAN | Fe<br>STANDARD<br>DEVIATION |
|---------|------|------------------------------|------------|-----------------------|--------------------|-----------------------------|
|         | NO   | [μMFe/(L.min)][μMFe/(m2.hr)] |            |                       |                    |                             |
|         |      |                              |            |                       |                    |                             |
| HGNK    | 1    | 0.006915                     | 61         | 3                     | 20                 | 35.16                       |
|         | 2    | 0                            | 0          |                       |                    |                             |
|         | 3    | 0                            | 0          |                       |                    |                             |
| GNCV    | 1    | 0                            | 0          | 2                     | 1                  | 0.87                        |
|         | 2    | 0.00016667                   | 1          |                       |                    |                             |
|         | 3    | NI                           | NI         |                       |                    |                             |
| MDPT    | 1    | NI                           | NI         | 0                     | NI                 |                             |
|         | 2    | NI                           | NI         |                       |                    |                             |
|         | 3    | NI                           | NI         |                       |                    |                             |
| R 64    | 1    | 0                            | 0          | 2                     | 17                 | 24.18                       |
|         | 2    | NI                           | NI         |                       |                    |                             |
|         | 3    | 0.0050783                    | 34         |                       |                    |                             |

MAY 1994 FLUX continued

| STATION | CORE<br>NO | MN<br>SLOPE<br>[ $\mu\text{MMn}/(\text{L}.\text{min})$ ] | MN<br>FLUX<br>[ $\mu\text{MMn}/(\text{m}^2.\text{hr})$ ] | NUMBER<br>OF<br>CORES | MN<br>FLUX<br>MEAN | MN<br>STANDARD<br>DEVIATION |
|---------|------------|--|--|-----------------------|--------------------|-----------------------------|
| HGK     | 1          | 0.017607   | 165  | 3                     | 118                | 51.54                       |
|         | 2          | 0.010653   | 98   |                       |                    |                             |
|         | 3          | 0.00998  | 92   |                       |                    |                             |
| GNCV    | 1          | 0.0051183  | 47   | 3                     | 55                 | 16.85                       |
|         | 2          | 0.0096983  | 74   |                       |                    |                             |
|         | 3          | 0.004405   | 44   |                       |                    |                             |
| MDPT    | 1          | 0.0042378  | 41   | 3                     | 41                 | 0.71                        |
|         | 2          | 0.0056894  | 42   |                       |                    |                             |
|         | 3          | 0.0052784  | 42   |                       |                    |                             |
| R 64    | 1          | 0.0025583  | 17   | 3                     | 15                 | 2.20                        |
|         | 2          | 0.0019433  | 13   |                       |                    |                             |
|         | 3          | 0.0021583  | 15   |                       |                    |                             |

MAY 1994 FLUX continued

| STATION | CORE NO | BLANK DO     | BLANK NH4           | BLANK pH         | BLANK NO2+NO3       | BLANK DIP           | BLANK Si(OH)4        |
|---------|---------|--------------|---------------------|------------------|---------------------|---------------------|----------------------|
|         |         | [mg/(L.min)] | [ $\mu$ MN/(L.min)] | [-log H/(L.min)] | [ $\mu$ MN/(L.min)] | [ $\mu$ MP/(L.min)] | [ $\mu$ MSi/(L.min)] |
| HGK     | 1       | -0.00041     | -0.00527            | 0.00000          | 0.00000             | 0.00000             | 0.00000              |
|         | 2       | -0.00041     | -0.00527            | 0.00000          | 0.00000             | 0.00000             | 0.00000              |
|         | 3       | -0.00041     | -0.00527            | 0.00000          | 0.00000             | 0.00000             | 0.00000              |
| GNCV    | 1       | -0.00068     | 0.00000             | 0.00000          | 0.00000             | 0.00000             | 0.01326              |
|         | 2       | -0.00068     | 0.00000             | 0.00000          | 0.00000             | 0.00000             | 0.01326              |
|         | 3       | -0.00068     | 0.00000             | 0.00000          | 0.00000             | 0.00000             | 0.01326              |
| MDPT    | 1       | 0.00000      | 0.00000             | 0.00000          | 0.00222             | 0.00000             | 0.00000              |
|         | 2       | 0.00000      | 0.00000             | 0.00000          | 0.00222             | 0.00000             | 0.00000              |
|         | 3       | 0.00000      | 0.00000             | 0.00000          | 0.00222             | 0.00000             | 0.00000              |
| R 64    | 1       | 0.00000      | 0.00000             | 0.00000          | 0.00000             | 0.00000             | 0.00000              |
|         | 2       | 0.00000      | 0.00000             | 0.00000          | 0.00000             | 0.00000             | 0.00000              |
|         | 3       | 0.00000      | 0.00000             | 0.00000          | 0.00000             | 0.00000             | 0.00000              |

MAY 1994 FLUX continued

| STATION | CORE NO | BLANK<br>TCO2                        | BLANK<br>DOC                   | BLANK<br>DON                      | BLANK<br>DOP                      | BLANK<br>Fe                        | BLANK<br>Mn                        |
|---------|---------|--------------------------------------|--------------------------------|-----------------------------------|-----------------------------------|------------------------------------|------------------------------------|
|         |         | [ $\mu\text{MCO}_2/(\text{L.min})$ ] | [ $\text{mg}/(\text{L.min})$ ] | [ $\mu\text{MN}/(\text{L.min})$ ] | [ $\mu\text{MP}/(\text{L.min})$ ] | [ $\mu\text{MFe}/(\text{L.min})$ ] | [ $\mu\text{MMn}/(\text{L.min})$ ] |
| HGNK    | 1       | -0.02875                             | 0.00000                        | 0.00000                           | 0.00000                           | 0.00000                            | -0.00108                           |
|         | 2       | -0.02875                             | 0.00000                        | 0.00000                           | 0.00000                           | 0.00000                            | -0.00108                           |
|         | 3       | -0.02875                             | 0.00000                        | 0.00000                           | 0.00000                           | 0.00000                            | -0.00108                           |
| GNCV    | 1       | 0.03750                              | 0.00140                        | 0.00000                           | 0.00000                           | 0.00000                            | -0.00033                           |
|         | 2       | 0.03750                              | 0.00140                        | 0.00000                           | 0.00000                           | 0.00000                            | -0.00033                           |
|         | 3       | 0.03750                              | 0.00140                        | 0.00000                           | 0.00000                           | 0.00000                            | -0.00033                           |
| MDPT    | 1       | 0.00992                              | 0.00000                        | 0.00000                           | 0.00000                           | 0.00000                            | 0.00000                            |
|         | 2       | 0.00992                              | 0.00000                        | 0.00000                           | 0.00000                           | 0.00000                            | 0.00000                            |
|         | 3       | 0.00992                              | 0.00000                        | 0.00000                           | 0.00000                           | 0.00000                            | 0.00000                            |
| R 64    | 1       | 0.00000                              | 0.00000                        | 0.00000                           | 0.00044                           | 0.00000                            | 0.00000                            |
|         | 2       | 0.00000                              | 0.00000                        | 0.00000                           | 0.00044                           | 0.00000                            | 0.00000                            |
|         | 3       | 0.00000                              | 0.00000                        | 0.00000                           | 0.00044                           | 0.00000                            | 0.00000                            |

Numerical Water Quality and Contaminant Modeling (EL-22)

Tidal Fresh Potomac River and Maryland Mainstem

Sediment-Water Flux: Net sediment-water exchanges of dissolved oxygen and nutrients

| STATION | DATE     | CORE<br>NO | CORE<br>H2O<br>VOL<br>(mL) | CORE<br>DEPTH<br>(m) | DO<br>SLOPE<br>[mg/(L.min)] | DO<br>FLUX<br>[gO2/(m2.day)] | NUMBER<br>OF<br>CORES | DO<br>FLUX<br>MEAN | DO<br>STANDARD<br>DEVIATION |
|---------|----------|------------|----------------------------|----------------------|-----------------------------|------------------------------|-----------------------|--------------------|-----------------------------|
| HGNK    | 12JULY94 | 1          | 2020                       | 0.145                | -0.004316                   | -0.90                        | 3                     | -0.99              | 0.08                        |
|         |          | 2          | 2160                       | 0.155                | -0.004733                   | -1.06                        |                       |                    |                             |
|         |          | 3          | 2140                       | 0.154                | -0.004520                   | -1.00                        |                       |                    |                             |
| GNCV    | 12JULY94 | 1          | 1680                       | 0.121                | -0.010427                   | -1.38                        | 3                     | -1.61              | 0.21                        |
|         |          | 2          | 1670                       | 0.120                | -0.012402                   | -1.71                        |                       |                    |                             |
|         |          | 3          | 1760                       | 0.127                | -0.012135                   | -1.75                        |                       |                    |                             |
| MDPT    | 13JULY94 | 1          | 2060                       | 0.148                | -0.008839                   | -1.82                        | 3                     | -1.73              | 0.32                        |
|         |          | 2          | 2000                       | 0.144                | -0.006931                   | -1.37                        |                       |                    |                             |
|         |          | 3          | 1820                       | 0.131                | -0.010842                   | -1.99                        |                       |                    |                             |
| R 64    | 14JULY94 | 1          | 2090                       | 0.150                | -0.002227                   | -0.09                        | 3                     | -0.02              | 0.13                        |
|         |          | 2          | 2200                       | 0.158                | -0.001267                   | 0.13                         |                       |                    |                             |
|         |          | 3          | 2140                       | 0.154                | -0.002333                   | -0.11                        |                       |                    |                             |

JULY 1994 FLUX continued

| STATION | CORE<br>NO | NH4<br>SLOPE                                   | NH4<br>FLUX                                     | NUMBER<br>OF<br>CORES | NH4<br>FLUX<br>MEAN | NH4<br>STANDARD<br>DEVIATION |
|---------|------------|--|---|-----------------------|---------------------|------------------------------|
|         |            | [ $\mu\text{MN}/(\text{L} \cdot \text{min})$ ] | [ $\mu\text{MN}/(\text{m}^2 \cdot \text{hr})$ ] |                       |                     |                              |
| HGNK    | 1          | 0.034137                                       | 297.7   | 3                     | 246.9               | 48.0                         |
|         | 2          | 0.025822                                       | 240.8   |                       |                     |                              |
|         | 3          | 0.021890                                       | 202.2   |                       |                     |                              |
| GNCV    | 1          | 0.030010                                       | 203.0   | 3                     | 228.8               | 24.0                         |
|         | 2          | 0.036738                                       | 250.2   |                       |                     |                              |
|         | 3          | 0.032723                                       | 233.2   |                       |                     |                              |
| MDPT    | 1          | 0.061140                                       | 543.7   | 3                     | 554.8               | 437.0                        |
|         | 2          | 0.014313                                       | 123.6   |                       |                     |                              |
|         | 3          | 0.126940                                       | 997.3   |                       |                     |                              |
| R 64    | 1          | 0.032635                                       | 294.4   | 3                     | 296.0               | 58.0                         |
|         | 2          | 0.037355                                       | 354.7   |                       |                     |                              |
|         | 3          | 0.025857                                       | 238.9   |                       |                     |                              |

JULY 1994 FLUX continued

| STATION | CORE<br>NO | pH<br>SLOPE<br>[-log H/(L.min)][-log H/(m2.hr)] | pH<br>FLUX | NUMBER<br>OF<br>CORES | pH<br>FLUX<br>MEAN | pH<br>STANDARD<br>DEVIATION |
|---------|------------|---|------------|-----------------------|--------------------|-----------------------------|
| HGNK    | 1          | -0.0015098                                      | -13.2      | 3                     | -14.7              | 1.4750                      |
|         | 2          | -0.001726                                       | -16.1      |                       |                    |                             |
|         | 3          | -0.0016172                                      | -14.9      |                       |                    |                             |
| GNCV    | 1          | -0.0011029                                      | -8.0       | 3                     | -10.9              | 2.5266                      |
|         | 2          | -0.0016941                                      | -12.2      |                       |                    |                             |
|         | 3          | -0.001648                                       | -12.5      |                       |                    |                             |
| MDPT    | 1          | -0.00061646                                     | -5.5       | 3                     | -5.3               | 1.1011                      |
|         | 2          | -0.00048123                                     | -4.2       |                       |                    |                             |
|         | 3          | -0.00080701                                     | -6.3       |                       |                    |                             |
| R 64    | 1          | 0.00075667                                      | 6.8        | 3                     | 7.1                | 1.1125                      |
|         | 2          | 0.00064833                                      | 6.2        |                       |                    |                             |
|         | 3          | 0.00090167                                      | 8.3        |                       |                    |                             |

JULY 1994 FLUX continued

| STATION | CORE<br>NO | NO2 + NO3<br>SLOPE<br>[ $\mu\text{MN}/(\text{L} \cdot \text{min})$ ] | NO2 + NO3<br>FLUX<br>[ $\mu\text{MN}/(\text{m}^2 \cdot \text{hr})$ ] | NUMBER<br>OF<br>CORES | NO2 + NO3<br>FLUX<br>MEAN | NO2 + NO3<br>STANDARD<br>DEVIATION |
|---------|------------|--|--|-----------------------|---------------------------|------------------------------------|
| HGNK    | 1          | -0.057894  | -416.4   | 3                     | -342.5                    | 64.11                              |
|         | 2          | -0.04326   | -308.8   |                       |                           |                                    |
|         | 3          | -0.042853  | -302.2   |                       |                           |                                    |
| GNCV    | 1          | -0.0061487   | -44.6  | 3                     | -48.7                     | 5.77                               |
|         | 2          | -0.0076662   | -55.3  |                       |                           |                                    |
|         | 3          | -0.006072  | -46.1  |                       |                           |                                    |
| MDPT    | 1          | NI   | NI   | 0                     | NI                        |                                    |
|         | 2          | NI   | NI   |                       |                           |                                    |
|         | 3          | NI   | NI   |                       |                           |                                    |
| R 64    | 1          | NI   | NI   | 0                     | NI                        |                                    |
|         | 2          | NI   | NI   |                       |                           |                                    |
|         | 3          | NI   | NI   |                       |                           |                                    |

JULY 1994 FLUX continued

| STATION                    | CORE | DIP       | DIP  | NUMBER | DIP   | DIP      |
|----------------------------|------|-----------|------|--------|-------|----------|
|                            | NO   | SLOPE     | FLUX | OF     | FLUX  | STANDARD |
|                            |      | CORES     |      |        |       |          |
| [μMP/(L.min)][μMP/(m2.hr)] |      |           |      |        |       |          |
| HGNK                       | 1    | 0.000588  | 5.1  | 2      | 5.49  | 0.51     |
|                            | 2    | NI        | NI   |        |       |          |
|                            | 3    | 0.000633  | 5.8  |        |       |          |
| GNCV                       | 1    | 0.001916  | 13.9 | 1      | 13.89 | 0.00     |
|                            | 2    | NI        | NI   |        |       |          |
|                            | 3    | NI        | NI   |        |       |          |
| MDPT                       | 1    | -0.001082 | -9.6 | 1      | -9.62 | 0.00     |
|                            | 2    | NI        | NI   |        |       |          |
|                            | 3    | NI        | NI   |        |       |          |
| R 64                       | 1    | 0.004653  | 42.0 | 3      | 44.39 | 3.51     |
|                            | 2    | 0.005098  | 48.4 |        |       |          |
|                            | 3    | 0.004632  | 42.8 |        |       |          |

JULY 1994 FLUX continued

| STATION | CORE<br>NO | SILICATE<br>SLOPE<br>[ $\mu\text{MSi}/(\text{L}\cdot\text{min})$ ] | SILICATE<br>FLUX<br>[ $\mu\text{MSi}/(\text{m}^2\cdot\text{hr})$ ] | NUMBER<br>OF<br>CORES | SILICATE<br>FLUX<br>MEAN | SILICATE<br>STANDARD<br>DEVIATION |
|---------|------------|--|--|-----------------------|--------------------------|-----------------------------------|
| HGNK    | 1          | 0.055057   | -124.9   | 3                     | -133.55                  | 104                               |
|         | 2          | 0.065698   | -34.3  |                       |                          |                                   |
|         | 3          | 0.043237   | -241.5   |                       |                          |                                   |
| GNCV    | 1          | 0.018037   | 130.8  | 3                     | 117.63                   | 26                                |
|         | 2          | 0.01864  | 134.4  |                       |                          |                                   |
|         | 3          | 0.011547   | 87.7   |                       |                          |                                   |
| MDPT    | 1          | NI   | NI   | 2                     | 517.49                   | 280                               |
|         | 2          | 0.037028   | 319.7  |                       |                          |                                   |
|         | 3          | 0.091053   | 715.3  |                       |                          |                                   |
| R 64    | 1          | 0.041295   | 350.3  | 3                     | 383.33                   | 89                                |
|         | 2          | 0.03566  | 315.3  |                       |                          |                                   |
|         | 3          | 0.054898   | 484.4  |                       |                          |                                   |

JULY 1994 FLUX continued

| STATION | CORE<br>NO | TCO2<br>SLOPE<br>[ $\mu\text{MCO}_2/(\text{L} \cdot \text{min})$ ] | TCO2<br>FLUX<br>[ $\mu\text{MCO}_2/(\text{m}^2 \cdot \text{hr})$ ] | NUMBER<br>OF<br>CORES | TCO2<br>FLUX<br>MEAN | TCO2<br>STANDARD<br>DEVIATION |
|---------|------------|--|--|-----------------------|----------------------|-------------------------------|
|         |            |  |  |                       |                      |                               |
| HGNK    | 1          | 0.317290   | 2767   | 3                     | 2355                 | 360.14                        |
|         | 2          | 0.224850   | 2096   |                       |                      |                               |
|         | 3          | 0.238470   | 2203   |                       |                      |                               |
| GNCV    | 1          | 0.814750   | 5656   | 3                     | 5467                 | 165.40                        |
|         | 2          | 0.777510   | 5354   |                       |                      |                               |
|         | 3          | 0.744050   | 5389   |                       |                      |                               |
| MDPT    | 1          | 0.205690   | 1970   | 3                     | 2784                 | 705.83                        |
|         | 2          | 0.357140   | 3220   |                       |                      |                               |
|         | 3          | 0.386750   | 3163   |                       |                      |                               |
| R 64    | 1          | 0.125540   | 1735   | 3                     | 1953                 | 556.08                        |
|         | 2          | 0.205340   | 2585   |                       |                      |                               |
|         | 3          | 0.099672   | 1538   |                       |                      |                               |

JULY 1994 FLUX continued

| STATION | CORE<br>NO | DOC<br>SLOPE<br>[mg/(L.min)] | DOC<br>FLUX<br>[gDOC/(m2.day)] | NUMBER<br>OF<br>CORES | DOC<br>FLUX<br>MEAN | DOC<br>STANDARD<br>DEVIATION |
|---------|------------|------------------------------|--------------------------------|-----------------------|---------------------|------------------------------|
| HGK     | 1          | 0                            | 0                              | 3                     | 8.12058993          | 7.23                         |
|         | 2          | 0.0014867                    | 13.8616058                     |                       |                     |                              |
|         | 3          | 0.0011367                    | 10.500164                      |                       |                     |                              |
| GNCV    | 1          | 0.001605                     | 11.6391367                     | 3                     | 13.4477813          | 14.44                        |
|         | 2          | 0                            | 0                              |                       |                     |                              |
|         | 3          | 0.0037783                    | 28.7042072                     |                       |                     |                              |
| MDPT    | 1          | -0.00038071                  | 3.43919223                     | 3                     | 5.36477669          | 1.69                         |
|         | 2          | 0                            | 6.62572662                     |                       |                     |                              |
|         | 3          | 0                            | 6.02941122                     |                       |                     |                              |
| R 64    | 1          | 0.00030833                   | 4.76637281                     | 3                     | 2.96260388          | 1.56                         |
|         | 2          | 0                            | 2.08920863                     |                       |                     |                              |
|         | 3          | 0                            | 2.03223022                     |                       |                     |                              |

JULY 1994 FLUX continued

| STATION | CORE<br>NO | DON<br>SLOPE<br>( $\mu\text{MN}/\text{min}$ ) | DON<br>FLUX<br>( $\mu\text{MN}/(\text{m}^2.\text{hr})$ ) | NUMBER<br>OF<br>CORES | DON<br>FLUX<br>MEAN | DON<br>STANDARD<br>DEVIATION |
|---------|------------|---|--|-----------------------|---------------------|------------------------------|
| HGK     | 1          | -0.022052                                     | -192.280748  | 2                     | -172.091568         | 28.6                         |
|         | 2          | -0.016292                                     | -151.902388  |                       |                     |                              |
|         | 3          | NI  | NI   |                       |                     |                              |
| GNCV    | 1          | NI  | NI   | 0                     | NI                  |                              |
|         | 2          | NI  | NI   |                       |                     |                              |
|         | 3          | NI  | NI   |                       |                     |                              |
| MDPT    | 1          | NI  | NI   | 0                     | NI                  |                              |
|         | 2          | NI  | NI   |                       |                     |                              |
|         | 3          | NI  | NI   |                       |                     |                              |
| R 64    | 1          | NI  | NI   | 0                     | NI                  |                              |
|         | 2          | NI  | NI   |                       |                     |                              |
|         | 3          | NI  | NI   |                       |                     |                              |

JULY 1994 FLUX continued

| STATION | CORE<br>NO | DOP<br>SLOPE<br>[ $\mu\text{MP}/(\text{L}.\text{min})$ ] | DOP<br>FLUX<br>[ $\mu\text{MP}/(\text{m}^2.\text{hr})$ ] | NUMBER<br>OF<br>CORES | DOP<br>FLUX<br>MEAN | DOP<br>STANDARD<br>DEVIATION |
|---------|------------|--|--|-----------------------|---------------------|------------------------------|
| HGNK    | 1          | 0.002107   | 18.3718273   | 2                     | 9.18591367          | 12.99                        |
|         | 2          | 0  | 0  |                       |                     |                              |
|         | 3          | NI   | NI   |                       |                     |                              |
| GNCV    | 1          | NI   | NI   | 0                     | NI                  |                              |
|         | 2          | NI   | NI   |                       |                     |                              |
|         | 3          | NI   | NI   |                       |                     |                              |
| MDPT    | 1          | NI   | NI   | 0                     | NI                  |                              |
|         | 2          | NI   | NI   |                       |                     |                              |
|         | 3          | NI   | NI   |                       |                     |                              |
| R 64    | 1          | 0.001275   | 11.502518  | 1                     | 11.502518           | 0.00                         |
|         | 2          | NI   | NI   |                       |                     |                              |
|         | 3          | NI   | NI   |                       |                     |                              |

JULY 1994 FLUX continued

| STATION | CORE | Fe<br>SLOPE                  | Fe<br>FLUX  | NUMBER<br>OF<br>CORES | Fe<br>FLUX<br>MEAN | Fe<br>STANDARD<br>DEVIATION |
|---------|------|------------------------------|-------------|-----------------------|--------------------|-----------------------------|
|         | NO   | [μMFe/(L.min)][μMFe/(m2.hr)] |             |                       |                    |                             |
|         |      |                              |             |                       |                    |                             |
| HGNK    | 1    | -0.0073167                   | -18.18      | 3                     | -15.5578273        | 6.69                        |
|         | 2    | -0.006085                    | -7.9559482  |                       |                    |                             |
|         | 3    | -0.007455                    | -20.5375338 |                       |                    |                             |
| GNCV    | 1    | -0.006805                    | -26.2515108 | 3                     | -28.8351683        | 2.25                        |
|         | 2    | -0.0074                      | -30.3843885 |                       |                    |                             |
|         | 3    | -0.0071167                   | -29.8696058 |                       |                    |                             |
| MDPT    | 1    | -0.0050633                   | -19.6070504 | 3                     | -27.6483367        | 40.52                       |
|         | 2    | -0.0019033                   | 8.24460432  |                       |                    |                             |
|         | 3    | -0.01197                     | -71.582564  |                       |                    |                             |
| R 64    | 1    | -0.002095                    | 12.0591496  | 3                     | 12.2706201         | 20.21                       |
|         | 2    | 0                            | 32.5888058  |                       |                    |                             |
|         | 3    | -0.00428                     | -7.83609496 |                       |                    |                             |

JULY 1994 FLUX continued

| STATION | CORE | MN                           | MN          | NUMBER | MN          | MN       |
|---------|------|------------------------------|-------------|--------|-------------|----------|
|         | NO   | SLOPE                        | FLUX        | OF     | FLUX        | STANDARD |
|         |      | [μMMn/(L.min)][μMMn/(m2.hr)] |             |        |             |          |
| HGNK    | 1    | 0.017352                     | 151.299453  | 3      | 174.408518  | 28.13    |
|         | 2    | 0.02793                      | 260.412086  |        |             |          |
|         | 3    | 0.012072                     | 111.514014  |        |             |          |
| GNCV    | 1    | 0                            | 0           | 3      | -1.71832863 | 5.71     |
|         | 2    | -0.0011224                   | -8.09096978 |        |             |          |
|         | 3    | 0.00038646                   | 2.93598388  |        |             |          |
| MDPT    | 1    | 0.028147                     | 250.285554  | 3      | 257.452115  | 145.42   |
|         | 2    | 0.013408                     | 115.752518  |        |             |          |
|         | 3    | 0.05172                      | 406.318273  |        |             |          |
| R 64    | 1    | 0                            | 0           | 3      | 0           | 0.00     |
|         | 2    | 0                            | 0           |        |             |          |
|         | 3    | 0                            | 0           |        |             |          |

JULY 1994 FLUX continued

| STATION | CORE NO | BLANK DO<br>[mg/(L.min)] | BLANK NH4<br>[μMN/(L.min)] | BLANK pH<br>[-log H/(L.min)] | BLANK NO2+NO3<br>[μMN/(L.min)] | BLANK DIP<br>[μMP/(L.min)] | BLANK Si(OH)4<br>[μMSi/(L.min)] |
|---------|---------|--------------------------|----------------------------|------------------------------|--------------------------------|----------------------------|---------------------------------|
| HGNK    | 1       | 0.00000                  | 0.00000                    | 0.00000                      | -0.01014                       | 0.00000                    | 0.06938                         |
|         | 2       | 0.00000                  | 0.00000                    | 0.00000                      | -0.01014                       | 0.00000                    | 0.06938                         |
|         | 3       | 0.00000                  | 0.00000                    | 0.00000                      | -0.01014                       | 0.00000                    | 0.06938                         |
| GNCV    | 1       | -0.00251                 | 0.00202                    | 0.00000                      | 0.00000                        | 0.00000                    | 0.00000                         |
|         | 2       | -0.00251                 | 0.00202                    | 0.00000                      | 0.00000                        | 0.00000                    | 0.00000                         |
|         | 3       | -0.00251                 | 0.00202                    | 0.00000                      | 0.00000                        | 0.00000                    | 0.00000                         |
| MDPT    | 1       | -0.00030                 | 0.00000                    | 0.00000                      | 0.00357                        | 0.00000                    | 0.00000                         |
|         | 2       | -0.00030                 | 0.00000                    | 0.00000                      | 0.00357                        | 0.00000                    | 0.00000                         |
|         | 3       | -0.00030                 | 0.00000                    | 0.00000                      | 0.00357                        | 0.00000                    | 0.00000                         |
| R 64    | 1       | -0.00183                 | 0.00000                    | 0.00000                      | 0.00000                        | 0.00000                    | 0.00246                         |
|         | 2       | -0.00183                 | 0.00000                    | 0.00000                      | 0.00000                        | 0.00000                    | 0.00246                         |
|         | 3       | -0.00183                 | 0.00000                    | 0.00000                      | 0.00000                        | 0.00000                    | 0.00246                         |

JULY 1994 FLUX continued

| STATION | CORE NO | BLANK<br>TCO2   | BLANK<br>DOC<br>[mg/(L.min)] | BLANK<br>DON<br>[μMN/(L.min)] | BLANK<br>DOP<br>[μMP/(L.min)] | BLANK<br>Fe<br>[μMFe/(L.min)] | BLANK<br>Mn<br>[μMMn/(L.min)] |
|---------|---------|-----------------|------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
|         |         | [μMCO2/(L.min)] |                              |                               |                               |                               |                               |
| HGNK    | 1       | 0.00000         | 0.00000                      | 0.00000                       | 0.00000                       | -0.00523                      | 0.00000                       |
|         | 2       | 0.00000         | 0.00000                      | 0.00000                       | 0.00000                       | -0.00523                      | 0.00000                       |
|         | 3       | 0.00000         | 0.00000                      | 0.00000                       | 0.00000                       | -0.00523                      | 0.00000                       |
| GNCV    | 1       | 0.03474         | 0.00000                      | 0.00000                       | 0.00000                       | -0.00319                      | 0.00000                       |
|         | 2       | 0.03474         | 0.00000                      | 0.00000                       | 0.00000                       | -0.00319                      | 0.00000                       |
|         | 3       | 0.03474         | 0.00000                      | 0.00000                       | 0.00000                       | -0.00319                      | 0.00000                       |
| MDPT    | 1       | -0.01583        | -0.00077                     | 0.00000                       | 0.00000                       | -0.00286                      | 0.00000                       |
|         | 2       | -0.01583        | -0.00077                     | 0.00000                       | 0.00000                       | -0.00286                      | 0.00000                       |
|         | 3       | -0.01583        | -0.00077                     | 0.00000                       | 0.00000                       | -0.00286                      | 0.00000                       |
| R 64    | 1       | -0.06682        | -0.00022                     | 0.00000                       | 0.00000                       | -0.00343                      | 0.00000                       |
|         | 2       | -0.06682        | -0.00022                     | 0.00000                       | 0.00000                       | -0.00343                      | 0.00000                       |
|         | 3       | -0.06682        | -0.00022                     | 0.00000                       | 0.00000                       | -0.00343                      | 0.00000                       |

Numerical Water Quality and Contaminant Modeling (EL-22)

Tidal Fresh Potomac River and Maryland Mainstem

Sediment-Water Flux: Net sediment-water exchanges of dissolved oxygen and nutrients

| STATION | DATE    | CORE<br>NO | CORE<br>H2O<br>VOL<br>(mL) | CORE<br>DEPTH<br>(m) | DO<br>SLOPE<br>[mg/(L.min)] | DO<br>FLUX<br>[gO2/(m2.day)] | NUMBER<br>OF<br>CORES | DO<br>FLUX<br>MEAN | DO<br>STANDARD<br>DEVIATION |
|---------|---------|------------|----------------------------|----------------------|-----------------------------|------------------------------|-----------------------|--------------------|-----------------------------|
| HGNK    | 9AUG94  | 1          | 1900                       | 0.137                | -0.0088933                  | -1.4462417                   | 3                     | -1.437             | 0.17                        |
|         |         | 2          | 1910                       | 0.137                | -0.0079333                  | -1.2638978                   |                       |                    |                             |
|         |         | 3          | 1960                       | 0.141                | -0.0094244                  | -1.5997526                   |                       |                    |                             |
| GNCV    | 9AUG94  | 1          | 2600                       | 0.187                | -0.010272                   | -2.2439758                   | 3                     | -2.038             | 0.53                        |
|         |         | 2          | 2000                       | 0.144                | -0.0088753                  | -1.4367471                   |                       |                    |                             |
|         |         | 3          | 2500                       | 0.18                 | -0.011332                   | -2.4322014                   |                       |                    |                             |
| MDPT    | 10AUG94 | 1          | 1960                       | 0.141                | -0.0046819                  | -0.9506615                   | 3                     | -1.095             | 0.36                        |
|         |         | 2          | 2020                       | 0.145                | -0.0039486                  | -0.8263085                   |                       |                    |                             |
|         |         | 3          | 2060                       | 0.148                | -0.0070698                  | -1.5087665                   |                       |                    |                             |
| R 64    | 11AUG94 | 1          | 2040                       | 0.147                | -0.00011053                 | 0.0127035                    | 3                     | 9E-04              | 0.01                        |
|         |         | 2          | 2120                       | 0.153                | -0.00017669                 | -0.0013287                   |                       |                    |                             |
|         |         | 3          | 2080                       | 0.15                 | -0.00021136                 | -0.0087744                   |                       |                    |                             |

AUGUST 1994 FLUX continued

| STATION | CORE<br>NO | NH4<br>SLOPE<br>[ $\mu\text{MN}/(\text{L} \cdot \text{min})$ ] | NH4<br>FLUX<br>[ $\mu\text{MN}/(\text{m}^2 \cdot \text{hr})$ ] | NUMBER<br>OF<br>CORES | NH4<br>FLUX<br>MEAN | NH4<br>STANDARD<br>DEVIATION |
|---------|------------|--|--|-----------------------|---------------------|------------------------------|
| HGNK    | 1          | 0.092183   | 756.033237   | 3                     | 802.820403          | 125.97                       |
|         | 2          | 0.11468  | 945.491223   |                       |                     |                              |
|         | 3          | 0.083558   | 706.936748   |                       |                     |                              |
| GNCV    | 1          | 0.043728   | 472.305151   | 3                     | 422.317353          | 217.24                       |
|         | 2          | 0.023009   | 184.44259  |                       |                     |                              |
|         | 3          | 0.05819  | 610.204317   |                       |                     |                              |
| MDPT    | 1          | 0.028222   | 152.304691   | 3                     | 315.338475          | 259.22                       |
|         | 2          | 0.030802   | 179.463194   |                       |                     |                              |
|         | 3          | 0.079298   | 614.24754  |                       |                     |                              |
| R 64    | 1          | 0.024223   | 213.301813   | 3                     | 214.438158          | 16.59                        |
|         | 2          | 0.021686   | 198.450302   |                       |                     |                              |
|         | 3          | 0.025791   | 231.56236  |                       |                     |                              |

AUGUST 1994 FLUX continued

| STATION | CORE | pH<br>SLOPE                      | pH<br>FLUX  | NUMBER<br>OF<br>CORES | pH<br>FLUX<br>MEAN | pH<br>STANDARD<br>DEVIATION |
|---------|------|----------------------------------|-------------|-----------------------|--------------------|-----------------------------|
|         | NO   | [-log H/(L.min)][-log H/(m2.hr)] |             |                       |                    |                             |
|         |      |                                  |             |                       |                    |                             |
| HGK     | 1    | -0.00097749                      | -8.01682446 | 3                     | -9.21625755        | 1.0864                      |
|         | 2    | -0.0012292                       | -10.1342676 |                       |                    |                             |
|         | 3    | -0.0011226                       | -9.49768058 |                       |                    |                             |
| GNCV    | 1    | -0.0025089                       | -21.0249842 | 3                     | -15.7174072        | 8.0927                      |
|         | 2    | -0.0013772                       | -6.40299281 |                       |                    |                             |
|         | 3    | -0.0024633                       | -19.7242446 |                       |                    |                             |
| MDPT    | 1    | -0.00054979                      | -4.65146072 | 3                     | -1.55048691        | 2.6855                      |
|         | 2    | 0                                | 0           |                       |                    |                             |
|         | 3    | 0                                | 0           |                       |                    |                             |
| R 64    | 1    | 0.00028363                       | 0.41343022  | 3                     | 0.38597871         | 0.0841                      |
|         | 2    | 0.00028617                       | 0.45288691  |                       |                    |                             |
|         | 3    | 0.00026916                       | 0.29161899  |                       |                    |                             |

AUGUST 1994 FLUX continued

| STATION | CORE | NO2 + NO3<br>SLOPE         | NO2 + NO3<br>FLUX | NUMBER<br>OF<br>CORES | NO2 + NO3<br>FLUX<br>MEAN | NO2 + NO3<br>STANDARD<br>DEVIATION |
|---------|------|----------------------------|-------------------|-----------------------|---------------------------|------------------------------------|
|         | NO   | [μMN/(L.min)][μMN/(m2.hr)] |                   |                       |                           |                                    |
| HGNK    | 1    | -0.022315                  | -183.015108       | 2                     | -191.38295                | 11.83                              |
|         | 2    | NI                         | NI                |                       |                           |                                    |
|         | 3    | -0.02361                   | -199.750791       |                       |                           |                                    |
| GNCV    | 1    | -0.0069162                 | -77.6206619       | 2                     | -83.8410863               | 8.80                               |
|         | 2    | NI                         | NI                |                       |                           |                                    |
|         | 3    | -0.0083457                 | -90.0615108       |                       |                           |                                    |
| MDPT    | 1    | 0.0036633                  | 30.9930993        | 3                     | 21.6671597                | 37.77                              |
|         | 2    | 0.0061817                  | 53.9008662        |                       |                           |                                    |
|         | 3    | -0.0022371                 | -19.8924863       |                       |                           |                                    |
| R 64    | 1    | NI                         | NI                | 0                     | NI                        |                                    |
|         | 2    | NI                         | NI                |                       |                           |                                    |
|         | 3    | NI                         | NI                |                       |                           |                                    |

AUGUST 1994 FLUX continued

| STATION | CORE<br>NO | DIP<br>SLOPE               | DIP<br>FLUX | NUMBER<br>OF<br>CORES | DIP<br>FLUX<br>MEAN | DIP<br>STANDARD<br>DEVIATION |
|---------|------------|----------------------------|-------------|-----------------------|---------------------|------------------------------|
|         |            |                            |             |                       |                     |                              |
|         |            | [μMP/(L.min)][μMP/(m2.hr)] |             |                       |                     |                              |
| HGNK    | 1          | 0                          | 0           | 3                     | 0.2724646           | 2.07                         |
|         | 2          | -0.00012833                | -1.05803007 |                       |                     |                              |
|         | 3          | 0.00022167                 | 1.87542388  |                       |                     |                              |
| GNCV    | 1          | NI                         | NI          | 1                     | 6.2573741           | 0.00                         |
|         | 2          | NI                         | NI          |                       |                     |                              |
|         | 3          | 0.00057985                 | 6.2573741   |                       |                     |                              |
| MDPT    | 1          | NI                         | NI          | 1                     | 0                   | 0.00                         |
|         | 2          | NI                         | NI          |                       |                     |                              |
|         | 3          | 0                          | 0           |                       |                     |                              |
| R 64    | 1          | 0.0038619                  | 35.1749422  | 3                     | 32.0919908          | 3.53                         |
|         | 2          | 0.0034576                  | 32.8545704  |                       |                     |                              |
|         | 3          | 0.0030134                  | 28.2464599  |                       |                     |                              |

AUGUST 1994 FLUX continued

| STATION | CORE<br>NO | SILICATE<br>SLOPE<br>[ $\mu\text{MSi}/(\text{L} \cdot \text{min})$ ] | SILICATE<br>FLUX<br>[ $\mu\text{MSi}/(\text{m}^2 \cdot \text{hr})$ ] | NUMBER<br>OF<br>CORES | SILICATE<br>FLUX<br>MEAN | SILICATE<br>STANDARD<br>DEVIATION |
|---------|------------|--|--|-----------------------|--------------------------|-----------------------------------|
| HGNK    | 1          | 0.028155   | 230.911511   | 3                     | 225.948417               | 63                                |
|         | 2          | 0.032483   | 267.809482   |                       |                          |                                   |
|         | 3          | 0.021172   | 179.124259   |                       |                          |                                   |
| GNCV    | 1          | 0.026194   | 293.975827   | 3                     | 227.47036                | 133                               |
|         | 2          | 0.01159  | 100.057554   |                       |                          |                                   |
|         | 3          | 0.026723   | 288.377698   |                       |                          |                                   |
| MDPT    | 1          | 0.034388   | 290.937324   | 3                     | 559.452345               | 164                               |
|         | 2          | 0.06625  | 577.661871   |                       |                          |                                   |
|         | 3          | 0.091065   | 809.757842   |                       |                          |                                   |
| R 64    | 1          | 0.046489   | 409.370763   | 3                     | 353.132489               | 100                               |
|         | 2          | 0.043254   | 395.820777   |                       |                          |                                   |
|         | 3          | 0.028313   | 254.205928   |                       |                          |                                   |

AUGUST 1994 FLUX continued

| STATION                        | CORE<br>NO | TCO2<br>SLOPE | TCO2<br>FLUX | NUMBER<br>OF<br>CORES | TCO2<br>FLUX<br>MEAN | TCO2<br>STANDARD<br>DEVIATION |
|--------------------------------|------------|---------------|--------------|-----------------------|----------------------|-------------------------------|
| [μMCO2/(L.min)][μMCO2/(m2.hr)] |            |               |              |                       |                      |                               |
| HGNK                           | 1          | 0.63967       | 5246.21439   | 3                     | 5324.30029           | 508.61                        |
|                                | 2          | 0.71167       | 5867.43755   |                       |                      |                               |
|                                | 3          | 0.57435       | 4859.24892   |                       |                      |                               |
| GNCV                           | 1          | 0.81757       | 9175.60576   | 3                     | 7660.92374           | 2795.39                       |
|                                | 2          | 0.51373       | 4435.07914   |                       |                      |                               |
|                                | 3          | 0.86848       | 9372.08633   |                       |                      |                               |
| MDPT                           | 1          | 0.18288       | 1193.84305   | 3                     | 2692.97462           | 1393.71                       |
|                                | 2          | 0.49471       | 3949.3674    |                       |                      |                               |
|                                | 3          | 0.37192       | 2935.71341   |                       |                      |                               |
| R 64                           | 1          | 0.21509       | 1894.02993   | 3                     | 1726.53122           | 145.31                        |
|                                | 2          | 0.18045       | 1651.31223   |                       |                      |                               |
|                                | 3          | 0.18202       | 1634.25151   |                       |                      |                               |

AUGUST 1994 FLUX continued

| STATION | CORE<br>NO | DOC<br>SLOPE<br>[mg/(L.min)][gDOC/(m2.day)] | DOC<br>FLUX | NUMBER<br>OF<br>CORES | DOC<br>FLUX<br>MEAN | DOC<br>STANDARD<br>DEVIATION |
|---------|------------|---|-------------|-----------------------|---------------------|------------------------------|
| HGNK    | 1          | 0.000855                                    | 7.01        | 3                     | 2.34                | 4.05                         |
|         | 2          | 0.000000                                    | 0.00        |                       |                     |                              |
|         | 3          | 0.000000                                    | 0.00        |                       |                     |                              |
| GNCV    | 1          | 0.000000                                    | 0.00        | 3                     | 5.12                | 8.87                         |
|         | 2          | 0.000000                                    | 0.00        |                       |                     |                              |
|         | 3          | 0.001423                                    | 15.36       |                       |                     |                              |
| MDPT    | 1          | 0.000000                                    | 0.00        | 3                     | 0.00                | 0.00                         |
|         | 2          | 0.000000                                    | 0.00        |                       |                     |                              |
|         | 3          | 0.000000                                    | 0.00        |                       |                     |                              |
| R 64    | 1          | 0.000000                                    | 0.00        | 3                     | 0.00                | 0.00                         |
|         | 2          | 0.000000                                    | 0.00        |                       |                     |                              |
|         | 3          | 0.000000                                    | 0.00        |                       |                     |                              |

AUGUST 1994 FLUX continued

| STATION | CORE<br>NO | DON<br>SLOPE                                   | DON<br>FLUX                                     | NUMBER<br>OF<br>CORES | DON<br>FLUX<br>MEAN | DON<br>STANDARD<br>DEVIATION |
|---------|------------|--|---|-----------------------|---------------------|------------------------------|
|         |            | [ $\mu\text{MN}/(\text{L} \cdot \text{min})$ ] | [ $\mu\text{MN}/(\text{m}^2 \cdot \text{hr})$ ] |                       |                     |                              |
| HGK     | 1          | NI   | NI  | 0                     | NI                  |                              |
|         | 2          | NI   | NI  |                       |                     |                              |
|         | 3          | NI   | NI  |                       |                     |                              |
| GNCV    | 1          | NI   | NI  | 0                     | NI                  |                              |
|         | 2          | NI   | NI  |                       |                     |                              |
|         | 3          | NI   | NI  |                       |                     |                              |
| MDPT    | 1          | NI   | NI  | 0                     | NI                  |                              |
|         | 2          | NI   | NI  |                       |                     |                              |
|         | 3          | NI   | NI  |                       |                     |                              |
| R 64    | 1          | 0.015829                                       | 139.39  | 2                     | 186.83              | 67.1                         |
|         | 2          | 0.025601                                       | 234.28  |                       |                     |                              |
|         | 3          | NI   | NI  |                       |                     |                              |

AUGUST 1994 FLUX continued

| STATION | CORE | DOP                        | DOP    | NUMBER | DOP    | DOP       |
|---------|------|----------------------------|--------|--------|--------|-----------|
|         | NO   | SLOPE                      | FLUX   |        | OF     | FLUX      |
|         |      | [μMP/(L.min)][μMP/(m2.hr)] |        | CORES  | MEAN   | DEVIATION |
| HGNK    | 1    | 0.00013667                 | 1.12   | 3      | 0.37   | 0.65      |
|         | 2    | 0                          | 0.00   |        |        |           |
|         | 3    | 0                          | 0.00   |        |        |           |
| GNCV    | 1    | NI                         | NI     | 1      | 4.70   | 0.00      |
|         | 2    | NI                         | NI     |        |        |           |
|         | 3    | 0.00043589                 | 4.70   |        |        |           |
| MDPT    | 1    | 0.0010317                  | 8.73   | 2      | 5.71   | 4.27      |
|         | 2    | 0.00030848                 | 2.69   |        |        |           |
|         | 3    | NI                         | NI     |        |        |           |
| R 64    | 1    | 0.036043                   | 317.39 | 3      | 390.57 | 65.75     |
|         | 2    | 0.04859                    | 444.65 |        |        |           |
|         | 3    | 0.04563                    | 409.69 |        |        |           |

AUGUST 1994 FLUX continued

| STATION | CORE<br>NO | Fe<br>SLOPE<br>[ $\mu\text{MFe}/(\text{L}\cdot\text{min})$ ] | Fe<br>FLUX<br>[ $\mu\text{MFe}/(\text{m}^2\cdot\text{hr})$ ] | NUMBER<br>OF<br>CORES | Fe<br>FLUX<br>MEAN | Fe<br>STANDARD<br>DEVIATION |
|---------|------------|--|--|-----------------------|--------------------|-----------------------------|
| HGNK    | 1          | -0.005035  | -10  | 3                     | -16                | 5.62                        |
|         | 2          | -0.0062167   | -20  |                       |                    |                             |
|         | 3          | -0.00614   | -20  |                       |                    |                             |
| GNCV    | 1          | -0.0060751   | -37  | 3                     | -29                | 9.32                        |
|         | 2          | -0.0049432   | -18  |                       |                    |                             |
|         | 3          | -0.0056639   | -31  |                       |                    |                             |
| MDPT    | 1          | -0.0050133   | -24  | 3                     | -22                | 17.57                       |
|         | 2          | -0.0064917   | -38  |                       |                    |                             |
|         | 3          | -0.0024867   | -3   |                       |                    |                             |
| R 64    | 1          | 0  | 0  | 3                     | -5                 | 17.50                       |
|         | 2          | -0.0026483   | -24  |                       |                    |                             |
|         | 3          | 0.0010855  | 10   |                       |                    |                             |

AUGUST 1994 FLUX continued

| STATION | CORE | MN<br>SLOPE                  | MN<br>FLUX | NUMBER<br>OF<br>CORES | MN<br>FLUX<br>MEAN | MN<br>STANDARD<br>DEVIATION |
|---------|------|------------------------------|------------|-----------------------|--------------------|-----------------------------|
|         | NO   | [μMMn/(L.min)][μMMn/(m2.hr)] |            |                       |                    |                             |
| HGNK    | 1    | 0.0052817                    | 43         | 3                     | 55                 | 6.19                        |
|         | 2    | 0.010598                     | 87         |                       |                    |                             |
|         | 3    | 0.004085                     | 35         |                       |                    |                             |
| GNCV    | 1    | 0.0026099                    | 29         | 3                     | 21                 | 17.00                       |
|         | 2    | 0.00018484                   | 2          |                       |                    |                             |
|         | 3    | 0.0030125                    | 33         |                       |                    |                             |
| MDPT    | 1    | 0.016055                     | 137        | 3                     | 170                | 44.78                       |
|         | 2    | 0.017292                     | 152        |                       |                    |                             |
|         | 3    | 0.02471                      | 221        |                       |                    |                             |
| R 64    | 1    | -0.035297                    | 146        | 3                     | 182                | 305.90                      |
|         | 2    | -0.063332                    | -105       |                       |                    |                             |
|         | 3    | 0.004240                     | 504        |                       |                    |                             |

AUGUST 1994 FLUX continued

| STATION | CORE NO | BLANK DO<br>[mg/(L.min)] | BLANK NH4<br>[μMN/(L.min)] | BLANK pH<br>[-log H/(L.min)] | BLANK NO2+NO3<br>[μMN/(L.min)] | BLANK DIP<br>[μMP/(L.min)] | BLANK Si(OH)4<br>[μMSi/(L.min)] |
|---------|---------|--------------------------|----------------------------|------------------------------|--------------------------------|----------------------------|---------------------------------|
| HGNK    | 1       | -0.0015                  | 0.0000                     | 0.0000                       | 0.0000                         | 0.0000                     | 0.0000                          |
|         | 2       | -0.0015                  | 0.0000                     | 0.0000                       | 0.0000                         | 0.0000                     | 0.0000                          |
|         | 3       | -0.0015                  | 0.0000                     | 0.0000                       | 0.0000                         | 0.0000                     | 0.0000                          |
| GNCV    | 1       | -0.0019                  | 0.0016                     | -0.0006                      | 0.0000                         | 0.0000                     | 0.0000                          |
|         | 2       | -0.0019                  | 0.0016                     | -0.0006                      | 0.0000                         | 0.0000                     | 0.0000                          |
|         | 3       | -0.0019                  | 0.0016                     | -0.0006                      | 0.0000                         | 0.0000                     | 0.0000                          |
| MDPT    | 1       | 0.0000                   | 0.0102                     | 0.0000                       | 0.0000                         | 0.0000                     | 0.0000                          |
|         | 2       | 0.0000                   | 0.0102                     | 0.0000                       | 0.0000                         | 0.0000                     | 0.0000                          |
|         | 3       | 0.0000                   | 0.0102                     | 0.0000                       | 0.0000                         | 0.0000                     | 0.0000                          |
| R 64    | 1       | -0.0002                  | 0.0000                     | 0.0002                       | 0.0000                         | -0.0001                    | 0.0000                          |
|         | 2       | -0.0002                  | 0.0000                     | 0.0002                       | 0.0000                         | -0.0001                    | 0.0000                          |
|         | 3       | -0.0002                  | 0.0000                     | 0.0002                       | 0.0000                         | -0.0001                    | 0.0000                          |

AUGUST 1994 FLUX continued

| STATION | CORE NO | BLANK<br>TCO2                        | BLANK<br>DOC                   | BLANK<br>DON                      | BLANK<br>DOP                      | BLANK<br>Fe                        | BLANK<br>Mn                        |
|---------|---------|--------------------------------------|--------------------------------|-----------------------------------|-----------------------------------|------------------------------------|------------------------------------|
|         |         | [ $\mu\text{MCO}_2/(\text{L.min})$ ] | [ $\text{mg}/(\text{L.min})$ ] | [ $\mu\text{MN}/(\text{L.min})$ ] | [ $\mu\text{MP}/(\text{L.min})$ ] | [ $\mu\text{MFe}/(\text{L.min})$ ] | [ $\mu\text{MMn}/(\text{L.min})$ ] |
| HGK     | 1       | 0.0000                               | 0.0000                         | 0.0000                            | 0.0000                            | -0.0038                            | 0.0000                             |
|         | 2       | 0.0000                               | 0.0000                         | 0.0000                            | 0.0000                            | -0.0038                            | 0.0000                             |
|         | 3       | 0.0000                               | 0.0000                         | 0.0000                            | 0.0000                            | -0.0038                            | 0.0000                             |
| GNCV    | 1       | 0.0000                               | 0.0000                         | 0.0000                            | 0.0000                            | -0.0028                            | 0.0000                             |
|         | 2       | 0.0000                               | 0.0000                         | 0.0000                            | 0.0000                            | -0.0028                            | 0.0000                             |
|         | 3       | 0.0000                               | 0.0000                         | 0.0000                            | 0.0000                            | -0.0028                            | 0.0000                             |
| MDPT    | 1       | 0.0418                               | 0.0000                         | 0.0000                            | 0.0000                            | -0.0022                            | -0.0002                            |
|         | 2       | 0.0418                               | 0.0000                         | 0.0000                            | 0.0000                            | -0.0022                            | -0.0002                            |
|         | 3       | 0.0418                               | 0.0000                         | 0.0000                            | 0.0000                            | -0.0022                            | -0.0002                            |
| R 64    | 1       | 0.0000                               | 0.0000                         | 0.0000                            | 0.0000                            | 0.0000                             | -0.0519                            |
|         | 2       | 0.0000                               | 0.0000                         | 0.0000                            | 0.0000                            | 0.0000                             | -0.0519                            |
|         | 3       | 0.0000                               | 0.0000                         | 0.0000                            | 0.0000                            | 0.0000                             | -0.0519                            |

Numerical Water Quality and Contaminant Modeling (EL-22)

Tidal Fresh Potomac River and Maryland Mainstem

Sediment-Water Flux: Net sediment-water exchanges of dissolved oxygen and nutrients

| STATION | DATE    | CORE<br>NO | CORE<br>H2O<br>VOL<br>(mL) | CORE<br>DEPTH<br>(m) | DO<br>SLOPE<br>[mg/(L.min)] | DO<br>FLUX<br>[gO2/(m2.day)] | NUMBER<br>OF<br>CORES | DO<br>FLUX<br>MEAN | DO<br>STANDARD<br>DEVIATION |
|---------|---------|------------|----------------------------|----------------------|-----------------------------|------------------------------|-----------------------|--------------------|-----------------------------|
| HGNK    | 13OCT94 | 1          | 1880                       | 0.135                | -0.005906                   | -1.15                        | 3                     | -1.03              | 0.11                        |
|         |         | 2          | 1810                       | 0.130                | -0.005068                   | -0.95                        |                       |                    |                             |
|         |         | 3          | 2080                       | 0.150                | -0.004559                   | -0.98                        |                       |                    |                             |
| GNCV    | 13OCT94 | 1          | 2000                       | 0.144                | -0.005638                   | -1.00                        | 3                     | -1.05              | 0.11                        |
|         |         | 2          | 1960                       | 0.141                | -0.006605                   | -1.18                        |                       |                    |                             |
|         |         | 3          | 2000                       | 0.144                | -0.005555                   | -0.98                        |                       |                    |                             |
| MDPT    | 14OCT94 | 1          | 1980                       | 0.142                | -0.004002                   | -0.78                        | 3                     | -0.69              | 0.10                        |
|         |         | 2          | 1820                       | 0.131                | -0.003324                   | -0.59                        |                       |                    |                             |
|         |         | 3          | 1960                       | 0.141                | -0.003615                   | -0.69                        |                       |                    |                             |
| R 64    | 17OCT94 | 1          | 1850                       | 0.133                | -0.005625                   | -1.13                        | 3                     | -1.32              | 0.23                        |
|         |         | 2          | 2170                       | 0.156                | -0.005280                   | -1.25                        |                       |                    |                             |
|         |         | 3          | 1800                       | 0.129                | -0.008171                   | -1.57                        |                       |                    |                             |

OCTOBER 1994 FLUX continued

| STATION | CORE<br>NO | NH4<br>SLOPE                                   | NH4<br>FLUX                                     | NUMBER<br>OF<br>CORES | NH4<br>FLUX<br>MEAN | NH4<br>STANDARD<br>DEVIATION |
|---------|------------|--|---|-----------------------|---------------------|------------------------------|
|         |            | [ $\mu\text{MN}/(\text{L} \cdot \text{min})$ ] | [ $\mu\text{MN}/(\text{m}^2 \cdot \text{hr})$ ] |                       |                     |                              |
| HGNK    | 1          | 0.064022                                       | 519.5   | 3                     | 536.4               | 36.33                        |
|         | 2          | 0.065477                                       | 511.6   |                       |                     |                              |
|         | 3          | 0.064387                                       | 578.1   |                       |                     |                              |
| GNCV    | 1          | 0.012189                                       | 105.2   | 3                     | 148.1               | 81.41                        |
|         | 2          | 0.028597                                       | 241.9   |                       |                     |                              |
|         | 3          | 0.011237                                       | 97.0  |                       |                     |                              |
| MDPT    | 1          | 0.016607                                       | 141.9   | 3                     | 130.7               | 39.82                        |
|         | 2          | 0.020828                                       | 163.6   |                       |                     |                              |
|         | 3          | 0.010215                                       | 86.4  |                       |                     |                              |
| R 64    | 1          | 0.039488                                       | 315.3   | 3                     | 358.5               | 37.71                        |
|         | 2          | 0.041083                                       | 384.8   |                       |                     |                              |
|         | 3          | 0.048325                                       | 375.5   |                       |                     |                              |

OCTOBER 1994 FLUX continued

| STATION | CORE<br>NO | pH<br>SLOPE<br>[-log H/(L.min)] | pH<br>FLUX<br>[-log H/(m2.hr)] | NUMBER<br>OF<br>CORES | pH<br>FLUX<br>MEAN | pH<br>STANDARD<br>DEVIATION |
|---------|------------|---------------------------------|--------------------------------|-----------------------|--------------------|-----------------------------|
| HGNK    | 1          | NI                              | NI                             | 2                     | -5.6               | 0.1100                      |
|         | 2          | -0.00070314                     | -5.5                           |                       |                    |                             |
|         | 3          | -0.00062919                     | -5.6                           |                       |                    |                             |
| GNCV    | 1          | -0.0011411                      | -9.9                           | 2                     | -11.9              | 2.9267                      |
|         | 2          | -0.0016536                      | -14.0                          |                       |                    |                             |
|         | 3          | NI                              | NI                             |                       |                    |                             |
| MDPT    | 1          | -0.00048003                     | -4.1                           | 3                     | -2.3               | 2.1100                      |
|         | 2          | 0                               | 0.0                            |                       |                    |                             |
|         | 3          | -0.00034361                     | -2.9                           |                       |                    |                             |
| R 64    | 1          | -0.00062788                     | -5.0                           | 3                     | -3.4               | 2.9618                      |
|         | 2          | -0.00055928                     | -5.2                           |                       |                    |                             |
|         | 3          | 0                               | 0.0                            |                       |                    |                             |

OCTOBER 1994 FLUX continued

| STATION | CORE<br>NO | NO2 + NO3<br>SLOPE<br><br>[μMN/(L.min)] | NO2 + NO3<br>FLUX<br><br>[μMN/(m2.hr)] | NUMBER<br>OF<br>CORES | NO2 + NO3<br>FLUX<br>MEAN | NO2 + NO3<br>STANDARD<br>DEVIATION |
|---------|------------|---|--|-----------------------|---------------------------|------------------------------------|
| HGNK    | 1          | -0.075699                               | -298.5                                 | 3                     | 13.9                      | 274.23                             |
|         | 2          | -0.011378                               | 215.2                                  |                       |                           |                                    |
|         | 3          | -0.02501                                | 124.9                                  |                       |                           |                                    |
| GNCV    | 1          | -0.0092183                              | -79.6                                  | 3                     | -114.6                    | 60.85                              |
|         | 2          | -0.021854                               | -184.9                                 |                       |                           |                                    |
|         | 3          | -0.009199                               | -79.4                                  |                       |                           |                                    |
| MDPT    | 1          | 0.005074                                | 43.4                                   | 2                     | -46.8                     | 127.55                             |
|         | 2          | -0.01744                                | -137.0                                 |                       |                           |                                    |
|         | 3          | NI                                      | NI                                     |                       |                           |                                    |
| R 64    | 1          | -0.00089804                             | -7.2                                   | 3                     | -6.5                      | 2.34                               |
|         | 2          | -0.00041631                             | -3.9                                   |                       |                           |                                    |
|         | 3          | -0.0010854                              | -8.4                                   |                       |                           |                                    |

OCTOBER 1994 FLUX continued

| STATION | CORE<br>NO | DIP<br>SLOPE<br>[ $\mu\text{MP}/(\text{L} \cdot \text{min})$ ][ $\mu\text{MP}/(\text{m}^2 \cdot \text{hr})$ ] | DIP<br>FLUX | NUMBER<br>OF<br>CORES | DIP<br>FLUX<br>MEAN | DIP<br>STANDARD<br>DEVIATION |
|---------|------------|---|-------------|-----------------------|---------------------|------------------------------|
| HGNK    | 1          | 0.000000  | 0.0         | 3                     | 0.00                | 0.00                         |
|         | 2          | 0.000000  | 0.0         |                       |                     |                              |
|         | 3          | 0.000000  | 0.0         |                       |                     |                              |
| GNCV    | 1          | 0.000000  | 0.0         | 3                     | 0.77                | 1.64                         |
|         | 2          | 0.000274  | 2.3         |                       |                     |                              |
|         | 3          | 0.000000  | 0.0         |                       |                     |                              |
| MDPT    | 1          | 0.000000  | 0.0         | 3                     | 0.00                | 0.00                         |
|         | 2          | 0.000000  | 0.0         |                       |                     |                              |
|         | 3          | 0.000000  | 0.0         |                       |                     |                              |
| R 64    | 1          | 0.000413  | 3.3         | 3                     | 10.10               | 5.91                         |
|         | 2          | 0.001497  | 14.0        |                       |                     |                              |
|         | 3          | 0.001670  | 13.0        |                       |                     |                              |

OCTOBER 1994 FLUX continued

| STATION | CORE | SILICATE                     | SILICATE | NUMBER | SILICATE | SILICATE  |
|---------|------|------------------------------|----------|--------|----------|-----------|
|         | NO   | SLOPE                        | FLUX     |        | OF       | FLUX      |
|         |      |                              |          | CORES  | MEAN     | DEVIATION |
|         |      | [μMSI/(L.min)][μMSI/(m2.hr)] |          |        |          |           |
| HGNK    | 1    | 0.015614                     | -805.7   | 2      | -891.67  | 122       |
|         | 2    | NI                           | NI       |        |          |           |
|         | 3    | 0.0060144                    | -977.6   |        |          |           |
| GNCV    | 1    | NI                           | NI       | 2      | 114.94   | 252       |
|         | 2    | 0.034608                     | 292.8    |        |          |           |
|         | 3    | -0.0072879                   | -62.9    |        |          |           |
| MDPT    | 1    | 0.016432                     | 140.4    | 3      | 729.72   | 1041      |
|         | 2    | 0.24595                      | 1932.2   |        |          |           |
|         | 3    | 0.013771                     | 116.5    |        |          |           |
| R 64    | 1    | 0.033902                     | 112.4    | 3      | 158.02   | 19        |
|         | 2    | 0.043627                     | 222.9    |        |          |           |
|         | 3    | 0.037682                     | 138.7    |        |          |           |

OCTOBER 1994 FLUX continued

| STATION                        | CORE<br>NO | TCO2<br>SLOPE | TCO2<br>FLUX | NUMBER<br>OF<br>CORES | TCO2<br>FLUX<br>MEAN | TCO2<br>STANDARD<br>DEVIATION |
|--------------------------------|------------|---------------|--------------|-----------------------|----------------------|-------------------------------|
| [μMCO2/(L.min)][μMCO2/(m2.hr)] |            |               |              |                       |                      |                               |
| HGNK                           | 1          | 0.276510      | 993          | 3                     | 1447                 | 397.20                        |
|                                | 2          | 0.375610      | 1731         |                       |                      |                               |
|                                | 3          | 0.334330      | 1618         |                       |                      |                               |
| GNCV                           | 1          | 0.474470      | 4096         | 3                     | 4772                 | 1118.90                       |
|                                | 2          | 0.716730      | 6064         |                       |                      |                               |
|                                | 3          | 0.481520      | 4157         |                       |                      |                               |
| MDPT                           | 1          | 0.215830      | 425          | 3                     | 2138                 | 2753.33                       |
|                                | 2          | 0.842610      | 5314         |                       |                      |                               |
|                                | 3          | 0.246080      | 676          |                       |                      |                               |
| R 64                           | 1          | 0.427830      | 3416         | 3                     | 3663                 | 555.31                        |
|                                | 2          | 0.458920      | 4299         |                       |                      |                               |
|                                | 3          | 0.421280      | 3273         |                       |                      |                               |

OCTOBER 1994 FLUX continued

| STATION | CORE<br>NO | DOC<br>SLOPE<br>[mg/(L.min)][gDOC/(m2.day)] | DOC<br>FLUX | NUMBER<br>OF<br>CORES | DOC<br>FLUX<br>MEAN | DOC<br>STANDARD<br>DEVIATION |
|---------|------------|---|-------------|-----------------------|---------------------|------------------------------|
| HGNK    | 1          | 0.000000                                    | 2.97        | 3                     | 3.03                | 0.22                         |
|         | 2          | 0.000000                                    | 2.85        |                       |                     |                              |
|         | 3          | 0.000000                                    | 3.28        |                       |                     |                              |
| GNCV    | 1          | 0.000000                                    | 0.00        | 3                     | 0.00                | 0.00                         |
|         | 2          | 0.000000                                    | 0.00        |                       |                     |                              |
|         | 3          | 0.000000                                    | 0.00        |                       |                     |                              |
| MDPT    | 1          | 0.000000                                    | 0.00        | 3                     | -2.27               | 3.93                         |
|         | 2          | -0.000866                                   | -6.80       |                       |                     |                              |
|         | 3          | 0.000000                                    | 0.00        |                       |                     |                              |
| R 64    | 1          | -0.015773                                   | -125.96     | 3                     | -41.99              | 72.72                        |
|         | 2          | 0.000000                                    | 0.00        |                       |                     |                              |
|         | 3          | 0.000000                                    | 0.00        |                       |                     |                              |

OCTOBER 1994 FLUX continued

| STATION | CORE<br>NO | DON<br>SLOPE<br>[ $\mu\text{MN}/(\text{L} \cdot \text{min})$ ] | DON<br>FLUX<br>[ $\mu\text{MN}/(\text{m}^2 \cdot \text{hr})$ ] | NUMBER<br>OF<br>CORES | DON<br>FLUX<br>MEAN | DON<br>STANDARD<br>DEVIATION |
|---------|------------|--|--|-----------------------|---------------------|------------------------------|
| HGNK    | 1          | 0.060296   | 489.31   | 2                     | 311.04              | 252.115169                   |
|         | 2          | NI   | NI   |                       |                     |                              |
|         | 3          | 0.014787   | 132.76   |                       |                     |                              |
| GNCV    | 1          | NI   | NI   | 0                     | NI                  |                              |
|         | 2          | NI   | NI   |                       |                     |                              |
|         | 3          | NI   | NI   |                       |                     |                              |
| MDPT    | 1          | NI   | NI   | 1                     | -99.41              | 0                            |
|         | 2          | -0.012654  | -99.41   |                       |                     |                              |
|         | 3          | NI   | NI   |                       |                     |                              |
| R 64    | 1          | -0.0064273   | -51.33   | 1                     | -51.33              | 0                            |
|         | 2          | NI   | NI   |                       |                     |                              |
|         | 3          | NI   | NI   |                       |                     |                              |

OCTOBER 1994 FLUX continued

| STATION | CORE<br>NO | DOP<br>SLOPE        | DOP<br>FLUX         | NUMBER<br>OF<br>CORES | DOP<br>FLUX<br>MEAN | DOP<br>STANDARD<br>DEVIATION |
|---------|------------|---------------------|---------------------|-----------------------|---------------------|------------------------------|
|         |            | [ $\mu$ MP/(L.min)] | [ $\mu$ MP/(m2.hr)] |                       |                     |                              |
| HGNK    | 1          | 0                   | 0.00                | 3                     | 0.00                | 0.00                         |
|         | 2          | 0                   | 0.00                |                       |                     |                              |
|         | 3          | 0                   | 0.00                |                       |                     |                              |
| GNCV    | 1          | 0.00034144          | 2.95                | 1                     | 2.95                | 0.00                         |
|         | 2          | NI                  | NI                  |                       |                     |                              |
|         | 3          | NI                  | NI                  |                       |                     |                              |
| MDPT    | 1          | 0.00064537          | 5.52                | 1                     | 5.52                | 0.00                         |
|         | 2          | NI                  | NI                  |                       |                     |                              |
|         | 3          | NI                  | NI                  |                       |                     |                              |
| R 64    | 1          | -0.00024185         | -0.43               | 3                     | 0.33                | 1.00                         |
|         | 2          | -0.00019279         | -0.04               |                       |                     |                              |
|         | 3          | 0                   | 1.46                |                       |                     |                              |

OCTOBER 1994 FLUX continued

| STATION | CORE | Fe<br>SLOPE                  | Fe<br>FLUX | NUMBER<br>OF<br>CORES | Fe<br>FLUX<br>MEAN | Fe<br>STANDARD<br>DEVIATION |
|---------|------|------------------------------|------------|-----------------------|--------------------|-----------------------------|
|         | NO   | [μMFe/(L.min)][μMFe/(m2.hr)] |            |                       |                    |                             |
|         |      |                              |            |                       |                    |                             |
| HGNK    | 1    | -0.0054496                   | -5         | 2                     | 4                  | 13.99                       |
|         | 2    | -0.0029436                   | 14         |                       |                    |                             |
|         | 3    | NI                           | NI         |                       |                    |                             |
| GNCV    | 1    | NI                           | NI         | 2                     | 43                 | 14.25                       |
|         | 2    | 0.0032867                    | 53         |                       |                    |                             |
|         | 3    | 0.00082667                   | 33         |                       |                    |                             |
| MDPT    | 1    | -0.0021733                   | 6          | 3                     | 7                  | 8.57                        |
|         | 2    | -0.0029239                   | 0          |                       |                    |                             |
|         | 3    | -0.00091397                  | 16         |                       |                    |                             |
| R 64    | 1    | -0.02779                     | -209       | 3                     | -262               | 46.95                       |
|         | 2    | -0.033605                    | -300       |                       |                    |                             |
|         | 3    | -0.037072                    | -276       |                       |                    |                             |

OCTOBER 1994 FLUX continued

| STATION | CORE<br>NO | MN<br>SLOPE<br>[ $\mu\text{MMn}/(\text{L}\cdot\text{min})$ ] | MN<br>FLUX<br>[ $\mu\text{MMn}/(\text{m}^2\cdot\text{hr})$ ] | NUMBER<br>OF<br>CORES | MN<br>FLUX<br>MEAN | MN<br>STANDARD<br>DEVIATION |
|---------|------------|--|--|-----------------------|--------------------|-----------------------------|
| HGNK    | 1          | -0.016216  | -132   | 3                     | -115               | 20.9873362                  |
|         | 2          | -0.014384  | -112   |                       |                    |                             |
|         | 3          | -0.011351  | -102   |                       |                    |                             |
| GNCV    | 1          | -0.0065504   | -57  | 3                     | -62                | 11.1184415                  |
|         | 2          | -0.0088666   | -75  |                       |                    |                             |
|         | 3          | -0.0063769   | -55  |                       |                    |                             |
| MDPT    | 1          | 0.0044738  | 38   | 3                     | 47                 | 25.1826298                  |
|         | 2          | 0.0095557  | 75   |                       |                    |                             |
|         | 3          | 0.0031802  | 27   |                       |                    |                             |
| R 64    | 1          | -0.010888  | -87  | 3                     | -120               | 28.2174788                  |
|         | 2          | -0.014430  | -135   |                       |                    |                             |
|         | 3          | -0.017562  | -136   |                       |                    |                             |

OCTOBER 1994 FLUX continued

| STATION | CORE NO | BLANK DO<br>[mg/(L.min)] | BLANK NH4<br>[μMN/(L.min)] | BLANK pH<br>[-log H/(L.min)] | BLANK NO2+NO3<br>[μMN/(L.min)] | BLANK DIP<br>[μMP/(L.min)] | BLANK Si(OH)4<br>[μMSi/(L.min)] |
|---------|---------|--------------------------|----------------------------|------------------------------|--------------------------------|----------------------------|---------------------------------|
| HGNK    | 1       | 0.00000                  | 0.00000                    | 0.00000                      | -0.03892                       | 0.00000                    | 0.11490                         |
|         | 2       | 0.00000                  | 0.00000                    | 0.00000                      | -0.03892                       | 0.00000                    | 0.11490                         |
|         | 3       | 0.00000                  | 0.00000                    | 0.00000                      | -0.03892                       | 0.00000                    | 0.11490                         |
| GNCV    | 1       | -0.00081                 | 0.00000                    | 0.00000                      | 0.00000                        | 0.00000                    | 0.00000                         |
|         | 2       | -0.00081                 | 0.00000                    | 0.00000                      | 0.00000                        | 0.00000                    | 0.00000                         |
|         | 3       | -0.00081                 | 0.00000                    | 0.00000                      | 0.00000                        | 0.00000                    | 0.00000                         |
| MDPT    | 1       | -0.00021                 | 0.00000                    | 0.00000                      | 0.00000                        | 0.00000                    | 0.00000                         |
|         | 2       | -0.00021                 | 0.00000                    | 0.00000                      | 0.00000                        | 0.00000                    | 0.00000                         |
|         | 3       | -0.00021                 | 0.00000                    | 0.00000                      | 0.00000                        | 0.00000                    | 0.00000                         |
| R 64    | 1       | 0.00026                  | 0.00000                    | 0.00000                      | 0.00000                        | 0.00000                    | 0.01983                         |
|         | 2       | 0.00026                  | 0.00000                    | 0.00000                      | 0.00000                        | 0.00000                    | 0.01983                         |
|         | 3       | 0.00026                  | 0.00000                    | 0.00000                      | 0.00000                        | 0.00000                    | 0.01983                         |

OCTOBER 1994 FLUX continued

| STATION | CORE<br>NO | BLANK<br>TCO2                        | BLANK<br>DOC                   | BLANK<br>DON                      | BLANK<br>DOP                      | BLANK<br>Fe                        | BLANK<br>Mn                        |
|---------|------------|--------------------------------------|--------------------------------|-----------------------------------|-----------------------------------|------------------------------------|------------------------------------|
|         |            | [ $\mu\text{MCO}_2/(\text{L.min})$ ] | [ $\text{mg}/(\text{L.min})$ ] | [ $\mu\text{MN}/(\text{L.min})$ ] | [ $\mu\text{MP}/(\text{L.min})$ ] | [ $\mu\text{MFe}/(\text{L.min})$ ] | [ $\mu\text{MMn}/(\text{L.min})$ ] |
| HGNK    | 1          | 0.15411                              | -0.00037                       | 0.00000                           | 0.00000                           | -0.00477                           | 0.00000                            |
|         | 2          | 0.15411                              | -0.00037                       | 0.00000                           | 0.00000                           | -0.00477                           | 0.00000                            |
|         | 3          | 0.15411                              | -0.00037                       | 0.00000                           | 0.00000                           | -0.00477                           | 0.00000                            |
| GNCV    | 1          | 0.00000                              | 0.00000                        | 0.00000                           | 0.00000                           | -0.00303                           | 0.00000                            |
|         | 2          | 0.00000                              | 0.00000                        | 0.00000                           | 0.00000                           | -0.00303                           | 0.00000                            |
|         | 3          | 0.00000                              | 0.00000                        | 0.00000                           | 0.00000                           | -0.00303                           | 0.00000                            |
| MDPT    | 1          | 0.16615                              | 0.00000                        | 0.00000                           | 0.00000                           | -0.00286                           | 0.00000                            |
|         | 2          | 0.16615                              | 0.00000                        | 0.00000                           | 0.00000                           | -0.00286                           | 0.00000                            |
|         | 3          | 0.16615                              | 0.00000                        | 0.00000                           | 0.00000                           | -0.00286                           | 0.00000                            |
| R 64    | 1          | 0.00000                              | 0.00000                        | 0.00000                           | -0.00019                          | -0.00159                           | 0.00000                            |
|         | 2          | 0.00000                              | 0.00000                        | 0.00000                           | -0.00019                          | -0.00159                           | 0.00000                            |
|         | 3          | 0.00000                              | 0.00000                        | 0.00000                           | -0.00019                          | -0.00159                           | 0.00000                            |

Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Total Carbon Dioxide Corrections at R 64

| CORE | DATE    | TCO2 FLUX                                    | CaCO3   | BIOTIC CO2                                   | FLUX MEAN                                    |
|------|---------|--|---|--|--|
|      |         | [ $\mu\text{MCO}_2/(\text{m}^2.\text{hr})$ ] | [ $\mu\text{M}\text{Ca}/(\text{m}^2.\text{hr})$ ] | [ $\mu\text{MCO}_2/(\text{m}^2.\text{hr})$ ] | [ $\mu\text{MCO}_2/(\text{m}^2.\text{hr})$ ] |
| 1    | 21MAY95 | 8924   | -183  | 9107   | 9708   |
| 2    | 21MAY95 | NI   | 104   |  |  |
| 3    | 21MAY95 | 10309  | NS  | 10309  |  |
| 1    | 14JUL95 | 1735   | NS  | 2767   | 1953   |
| 2    | 14JUL95 | 2585   | NS  | 2096   |  |
| 3    | 14JUL95 | 1538   | NS  | 2203   |  |
| 1    | 11AUG95 | 1894   | -215  | 2109   | 1630   |
| 2    | 11AUG95 | 1651   | NS  | 1651   |  |
| 3    | 11AUG95 | 1634   | 503   | 1131   |  |
| 1    | 17OCT95 | 3416   | 654   | 2762   | 3067   |
| 2    | 17OCT95 | 4299   | 783   | 3516   |  |
| 3    | 17OCT95 | 3273   | 350   | 2923   |  |

Numerical Water Quality and Contaminant Modeling (EL-22)

Tidal Fresh Potomac River and Maryland Mainstem

Sulfate Flux : Sulfate depletion from sediment pore water

| STATION | DATE    | SO4<br>RATE OF CHANGE<br>(mg/L*day) | AVERAGE<br>POROSITY<br>%(wgt/wgt) | SEDIMENT<br>VOLUME<br>(L) | PROPERTY<br>CONSTANT<br>(cm2/m2) | SO4 FLUX<br>(mg/m2*day) | SO4 DEPLETION FLUX<br>(mM SO4 m-2*day) |
|---------|---------|-------------------------------------|-----------------------------------|---------------------------|----------------------------------|-------------------------|--|
| HGNK    | MAY     | NI                                  |                                   |                           |                                  | NI                      | NI                                     |
| GNCV    | MAY     | NI                                  |                                   |                           |                                  | NI                      | NI                                     |
| MDPT    | MAY     | NI                                  |                                   |                           |                                  | NI                      | NI                                     |
| R 64    | MAY     | NI                                  |                                   |                           |                                  | NI                      | NI                                     |
| HGNK    | JULY    | 0                                   | 0.87                              | 0.05                      | 1972                             | 0.00                    | 0.0                                    |
| GNCV    | JULY    | NI                                  |                                   |                           |                                  | NI                      | NI                                     |
| MDPT    | JULY    | -21.408                             | 0.90                              | 0.05                      | 1972                             | -1899.75                | 19.8                                   |
| R 64    | JULY    | -24.742                             | 0.88                              | 0.05                      | 1972                             | -2146.81                | 22.4                                   |
| HGNK    | AUGUST  | 0                                   | 0.87                              | 0.05                      | 1972                             | 0.00                    | 0.0                                    |
| GNCV    | AUGUST  | NI                                  |                                   |                           |                                  | NI                      | NI                                     |
| MDPT    | AUGUST  | -16.389                             | 0.89                              | 0.05                      | 1972                             | -1438.20                | 15.0                                   |
| R 64    | AUGUST  | -16.348                             | 0.92                              | 0.05                      | 1972                             | -1482.96                | 15.4                                   |
| HGNK    | OCTOBER | NI                                  |                                   |                           |                                  | NI                      | NI                                     |
| GNCV    | OCTOBER | NI                                  |                                   |                           |                                  | NI                      | NI                                     |
| MDPT    | OCTOBER | NI                                  |                                   |                           |                                  | NI                      | NI                                     |
| R 64    | OCTOBER | -16.438                             | 0.87                              | 0.05                      | 1972                             | -1410.08                | 14.7                                   |

Numerical Water Quality and Contaminant Modeling (EL-22)  
Tidal Fresh Potomac River and Maryland Mainstem  
Methane Flux: In-situ method

| STATION | DATE | TRAP<br>SET-TIME<br>(hr) | CH4<br>(mL) | %CH4 | MASS<br>( $\mu$ M) | CH4<br>FLUX<br>[ $\mu$ M/(m <sup>2</sup> .hr)] |
|---------|------|--------------------------|-------------|------|--------------------|--|
| HGNK    | MAY  | 20                       | 9           | 23.2 | 93.2               | 54.2   |
|         | JULY | 27.0                     | SS          |      |                    |  |
|         | AUG  | 25                       | 4           | 4.6  | 8.2                | 3.8  |
|         | OCT  |                          | 0           |      |                    |  |
| GNCV    | MAY  | 19.5                     | 15          | 26.5 | 177.5              | 105.8  |
|         | JULY | 26.9                     | 44          | 20.1 | 394.8              | 170.5  |
|         | AUG  | 24.8                     | 128         | 25.1 | 1434.3             | 671.7  |
|         | OCT  | 27.1                     | 65          | 21.1 | 612.3              | 262.5  |
| MDPT    | MAY  |                          | 0           |      |                    |  |
|         | JULY |                          | 0           |      |                    |  |
|         | AUG  | 25.9                     | 8           | 57.7 | 206.1              | 92.5   |
|         | OCT  |                          | 0           |      |                    |  |

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